MACWORLD

January 1988 $3.95
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The Macintosh® Magazine

Networks– Are They Worth It?

The perplexing choices

Scanners and Gray Scale
How It Works

PostScript Graphics Tools
3 Programs Compared

The Mac II and Ethernet
High-Speed Communications

Finding Help
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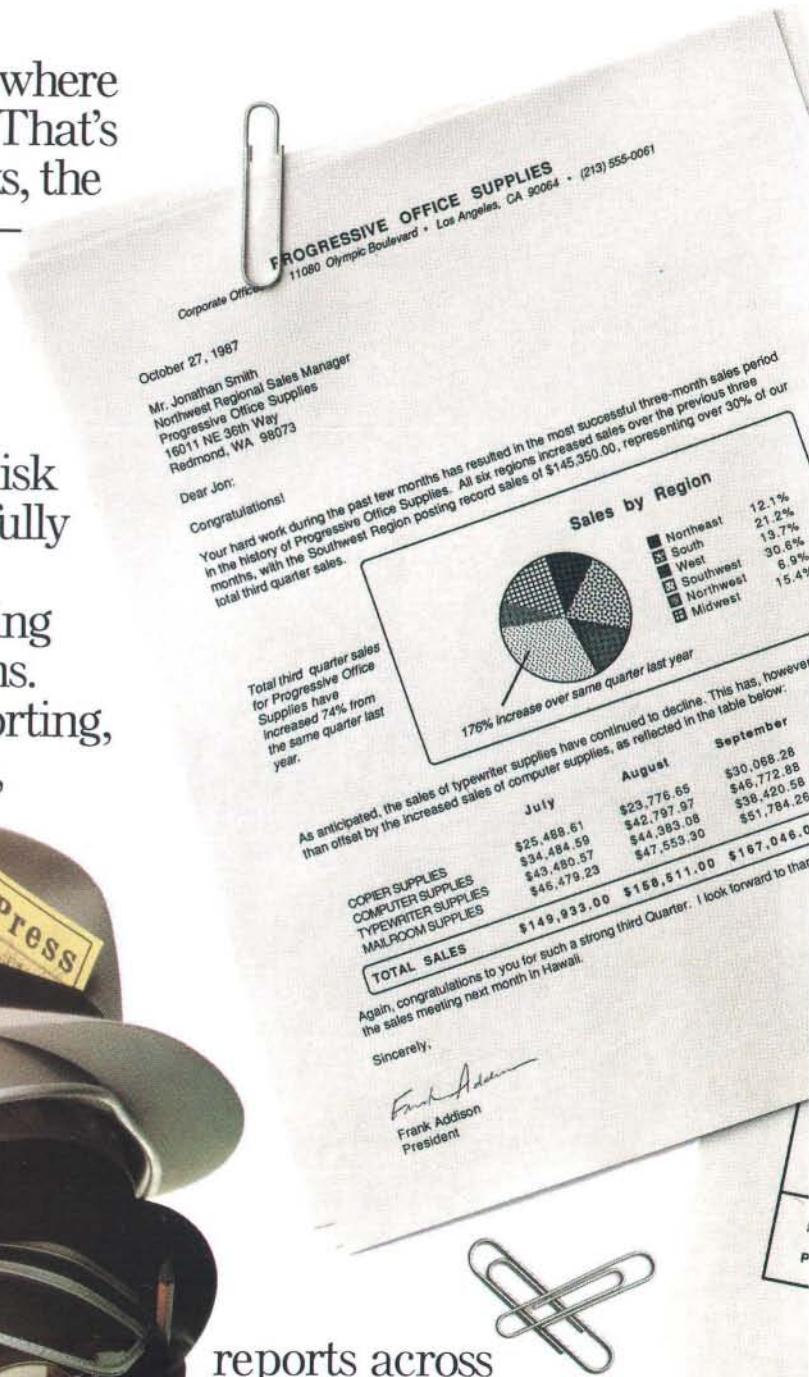
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October 27, 1987

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TYPEWRITER SUPPLIES	$43,480.57	$44,383.08	$36,420.56
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TOTAL SALES	$149,933.00	$158,511.00	$167,046.0

Again, congratulations to you for such a strong third Quarter. I look forward to that the sales meeting next month in Hawaii.

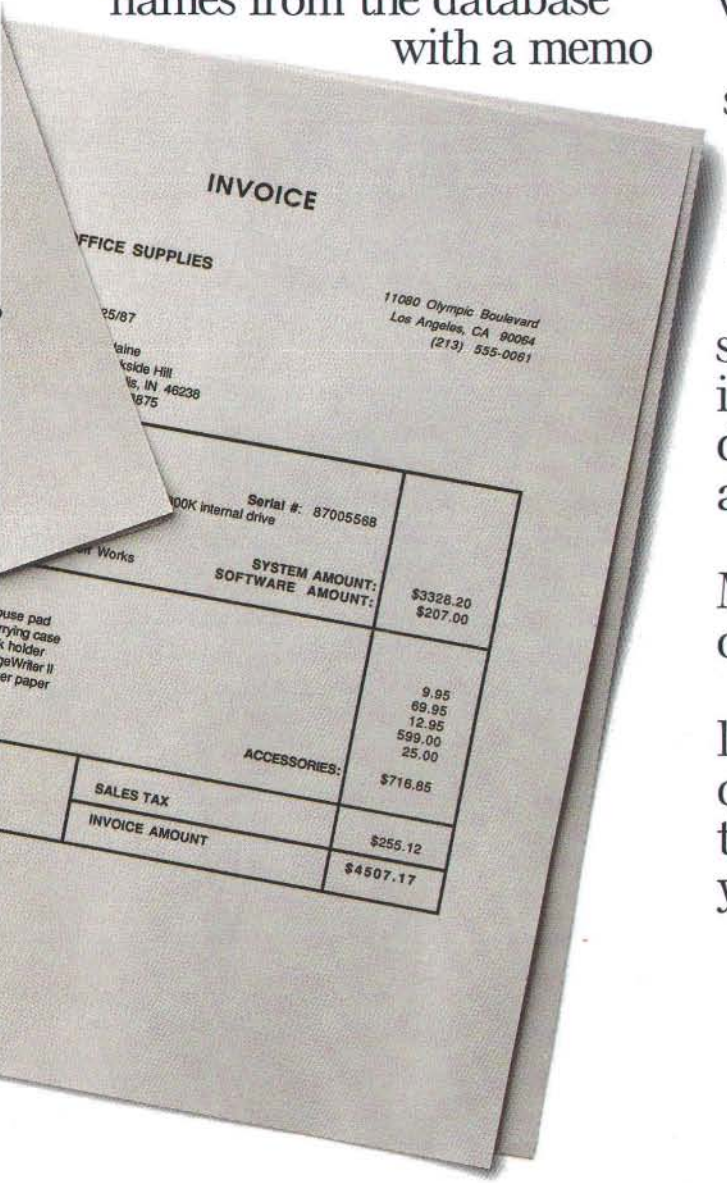
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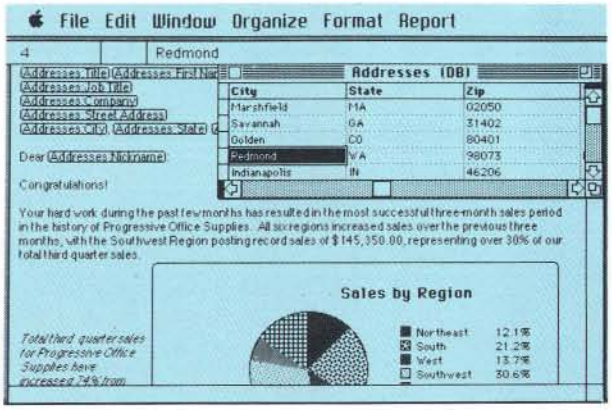
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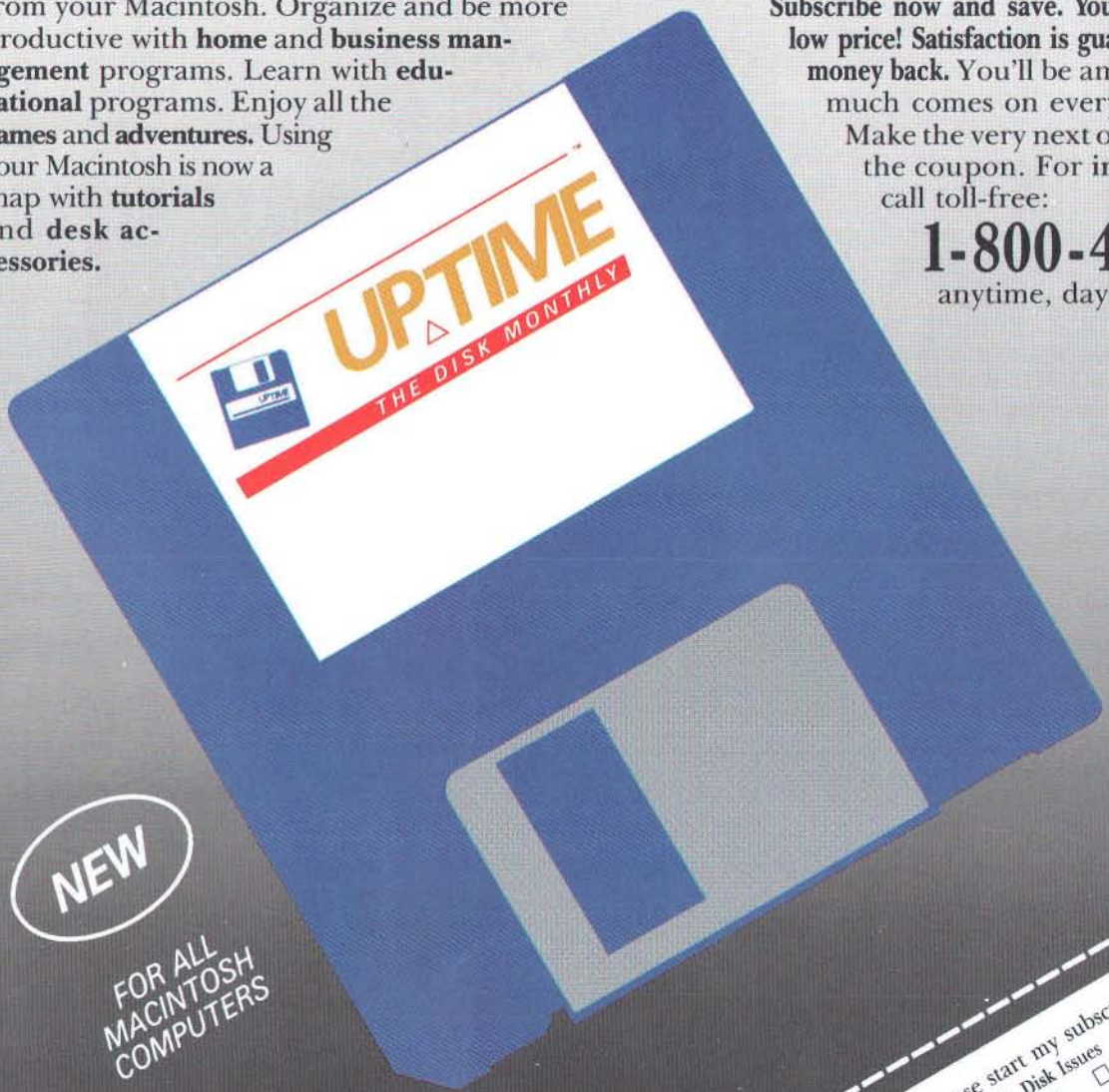
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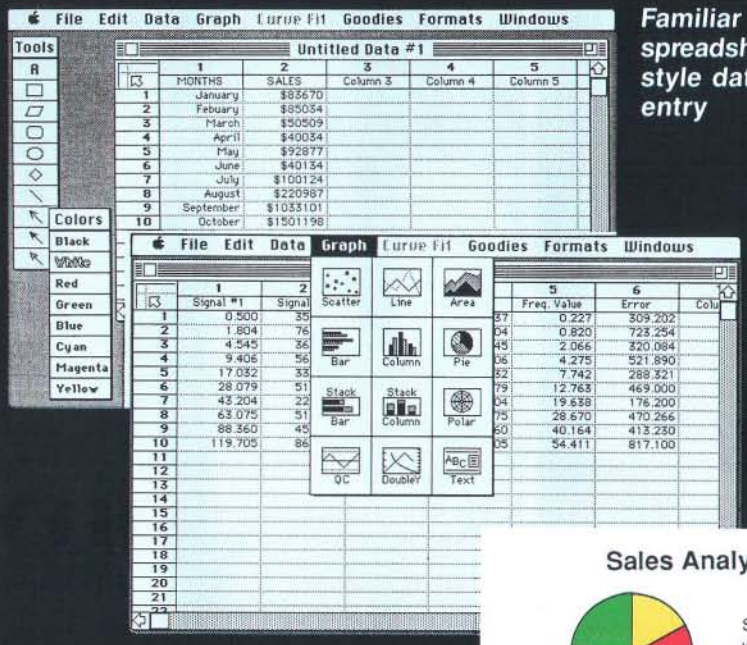
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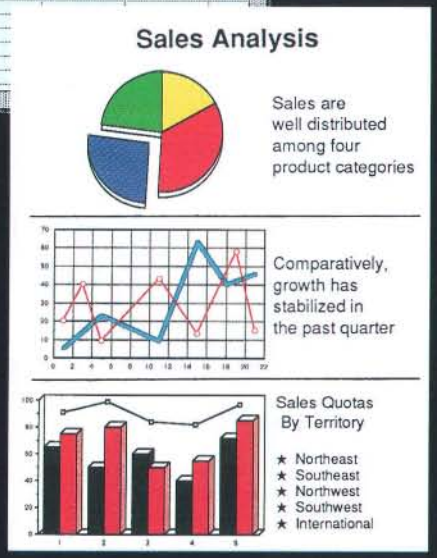
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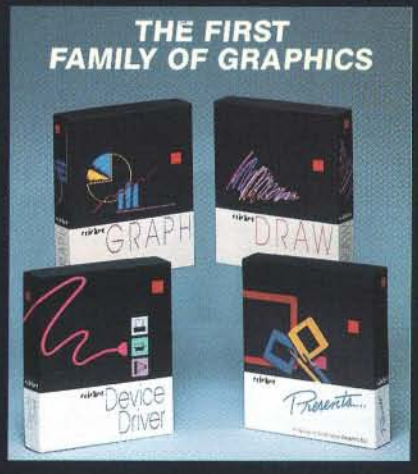
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When it comes to Macintosh graphics software, there's just one name to remember — Cricket Software. Your local dealer will be happy to introduce you to the entire family: Cricket Graph, Cricket Draw, Cricket Presents . . . , and Cricket Device Drivers.

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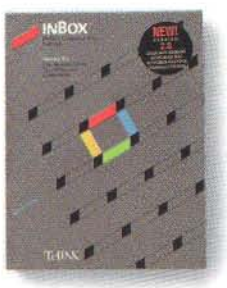
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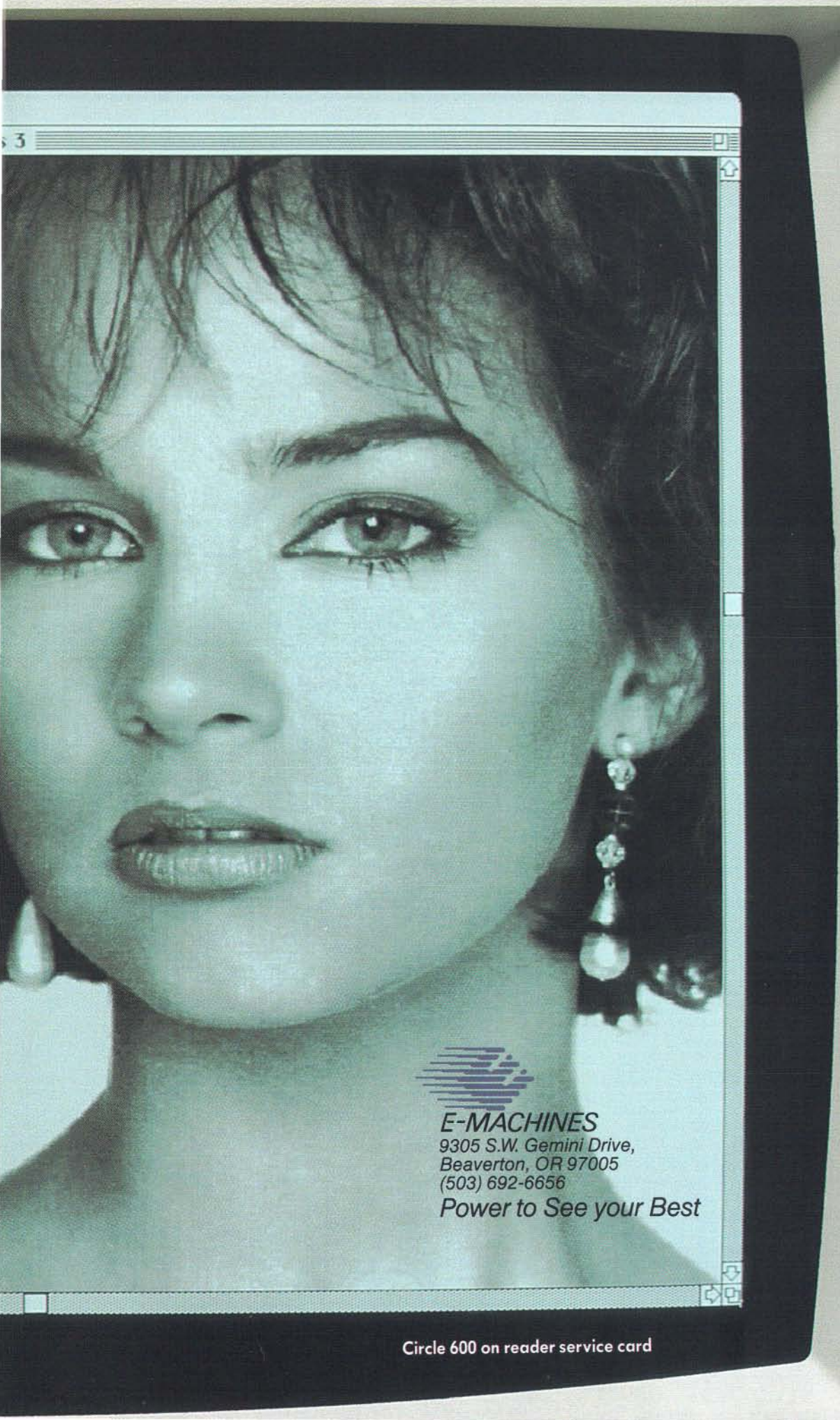
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Actual unretouched photograph of The Big Picture IQ™ screen



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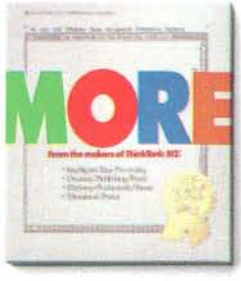
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Mac Bulletin

Laser Envelopes

If you've ever tried to print envelopes on a laser printer, you know how their uneven surfaces and small size can cause spotty printing and misfeeds.

That's why James River Corporation is offering Laser Envelopes (distributed by Pro-Tech of Ludlow, Massachusetts). Each Laser Envelope, which holds a standard business letter, is folded so that the 11-inch preglued pocket and the open flap is 8½ by 11 inches in size, just like an ordinary sheet of paper. The flap is coated with glue that won't melt when it passes by the printer's heating element.

Since the flap of this envelope is not folded under the pocket during printing, you can print a message on the flap simultaneously with the front address.

Taking Off the Limits

A nationwide bulletin board system called Portal Communications, based in Cupertino, California, is offering unlimited access to Macintosh shareware, electronic mail, and private conferences for only $10 per month plus Telenet communication charges.

Portal also provides two-way access to Usenet, a distributed conference system spanning four continents and 30 countries, to tens of thousands of users. In addition, Portal connects to the UUCP, ARPANet, Bitnet, and CSNet networks, many of which are based at major universities where participants know a great deal about the Macintosh.

The community of Macintosh users is growing rapidly, as is the Macintosh BBS system, offering many downloadable files and message sections. Messages are organized much like the Macintosh Hierarchical File System, making it easy to find a specific topic. Portal also hosts nightly real-time conferences like the CB mode used in other services.

MS Write's like Word

Microsoft Write is a low-cost version of the Mac's most popular word processor–*Microsoft Word*. Listing at $175, it appeals to the more cost-conscious user or one who doesn't want to become involved in the complexity of a full-fledged word processor.

Actually, *MS Write*'s simplicity was relatively easy to come by–Microsoft just eliminated some of *Word*'s features until the program went down in size from 357,274 bytes to 292,657 bytes in the beta version. *MS Write* offers full compatibility with *Word*'s file format, in case users decide to opt for a $220 upgrade.

But *MS Write* is much more than a stripped-down version of *Word;* according to Microsoft, *MS Write* runs faster and provides more features than any other Macintosh word processing program in its price range. The program is also relatively easy to use, since it includes a context-sensitive help menu. *MS Write* comes with an integrated spelling checker, a page-preview function, and the ability to convert files to *Word, MacWrite, Microsoft Works,* and ASCII text.

A Mac II Mainframe Connection

Novell, the leading local area network (LAN) manufacturer–over 145,000 systems worldwide–now has a LAN that allows the Mac II to emulate popular IBM terminals while accessing a compatible mainframe. To link up to Novell's high-speed LAN, which runs on telephone cabling, you need only an interface board that plugs into a Mac II. The board contains a 10-MHz 80186 processor and 512K of zero-wait-state memory.

Requisite software includes an emulation program that allows you to maintain five concurrent host sessions and use a subset of MS-DOS functions, and a program that provides high-speed transfers of both binary and text files. Each of these products can be purchased separately, or the complete hardware and software package is available for $1315 from Novell's Communications Products Division, 1157 San Antonio Rd., Mountain View, CA 94043.

ScreenWars

Apple reportedly intends to challenge Adobe's Display PostScript with an upgraded version of QuickDraw, called NuGraph. NuGraph will send sophisticated screen-description commands to the Mac's video circuitry. Both screen-description languages should pave the way for a new generation of advanced graphics programs.

As of this writing, Adobe seems to be out in front as it writes code to use Display PostScript on the Macintosh, Sun, IBM Series 60, and NeXT computers. Apple is still defining NuGraph's capabilities. But the real battle will be fought behind closed corporate doors as Apple and Adobe woo software and hardware developers with their offerings.

Adobe is sure to herald the use of PostScript in many laser printers and the potential for using the same popular language for both screen and printer. Also, Adobe will offer one screen-description language for all major computers, eliminating the need to rewrite a major portion of a program for each piece of hardware.

Apple is expected to counter with NuGraph's reported ability to write to both screen and printer–so that (like Display PostScript) no translation will be necessary. But it could mean Apple's future printers

(continues)

will be incompatible with most current laser printers.

If enough developers sign up with both Adobe and Apple, then both products will enter the marketplace, where customers will make the ultimate decision about which screen-description language best meets their needs.

Wait for January

▶ An animated advertisement on disk from General Motors' Buick Division, called *Buick Dimension* and mentioned in November's *Mac Bulletin,* won't be available until late January. Many readers called the toll-free number we listed, only to find it disconnected. Everyone who left a name and address with Buick's corporate headquarters on instructions from local dealers will receive the first available disks for the 1988-model year. Otherwise, to get on the distribution list, send your name and address to: Buick Distribution Center, c/o Adcom Inc., 6845 Dix St., Detroit, MI 48209.

115 Pages of Programs

▶ Educomp's latest catalog of shareware, public domain, and demonstration software is a veritable encyclopedia of low-cost software, listing the contents of 361 disks in 115 pages. Besides ordering listed software, you can look up the function of programs seen on local bulletin boards.

For example, business offerings include stock market analysis, office management, and *Multiplan* and *Excel* templates. One educational program teaches that Halloween needn't be scary; another shows the placement of continents on a globe.

Other software available includes graphics, animation, sound and music, start-up sounds, productivity, clip art, *MacDraw* pictures, fonts, PostScript for the LaserWriter, word processing, desk accessories, function keys, communications, utilities, games, and programming.

Disk prices range from $3.00 to $8.50 per disk depending on the quantity ordered. To obtain a catalog, write Educomp Computer Services at 742 Genevieve, Ste. D, Solana Beach, CA 92075.

Faster Mac-to-PC Connection

▶ Most of the less expensive Mac-to-PC connections are based on the AppleTalk Personal Network, which operates at 237,000 bits per second (bps), about 40 times slower than the much more expensive Ethernet.

QuickShare, from Compatible Systems of Boulder, Colorado, is a new Mac-to-PC connection. This product, which operates at 1.6 million bps, is some 6 times faster than the AppleTalk Personal Network because it uses the Mac's high-speed SCSI port—an important benefit when many large files must be transferred between Mac and MS-DOS formats.

QuickShare gives the Mac user full access to the PC's hard disks, floppy disks, and local area networks. It can also transfer compatible files between Mac and MS-DOS programs, as well as capture text and graphics output from MS-DOS applications and input them into Mac page-layout packages.

QuickShare includes an internal board for an MS-DOS computer, a cable, and software. It works with the Mac 512KE, Plus, SE, and Mac II.

Mac II 300-dpi Color Printer

▶ Tektronix of Beaverton, Oregon, is offering a 300-dpi, four-color printer that prints any of 16.8 million colors and accepts QuickDraw output (a PostScript interface is under consideration).

Tektronix's Model 4693B parallel-input printer, available immediately, is priced at $7995 plus $495 for the Mac II interface card, cable, and software—considerably less than the PostScript-compatible QMS G650's expected price of $20,000 to $25,000.

Tektronix uses a thermal printer from an undisclosed Japanese company. This machine melts wax off a non-reuseable, four-color ribbon that will last for 275 copies. Each printed page costs 35 cents, and each overhead transparency costs $1.25. Output speed is one page per minute. The image processor contains a 16-MHz 68020 processor and 4 megabytes of RAM (expandable to 12MB for $4000).

Color correction is available from within the printer or through some of the Mac II's color paint and graphics programs. Tektronix's software includes a screen dump that can provide output for color matching in ten seconds. Image size is very close to 8½ by 11 inches when using an 8½-by-14-inch piece of paper.

Your Best Stacks

▶ Send a disk of your best *HyperCard* stacks to: News Editor, *Macworld,* 501 Second St., San Francisco, CA 94107. We'll pay $25 for every entry selected for a new monthly item, "Your Best Stacks." Please tell us how you developed your stack, describe its features and who would use it, and let us know how readers can obtain more information. We'll also need to know if it's free, shareware, or a commercial product.

Dueling Spreadsheets

▶ To challenge *Microsoft Excel,* Lotus is developing a Mac version of *1-2-3,* which has become a standard spreadsheet in the MS-DOS world; the program probably won't be ready until later this year.

Microsoft announced that it will update *Excel* to version 1.5 in the first quarter of 1988 with color for the Mac II; customizable menu bars and dialog boxes; and multitasking support for Apple's MultiFinder, which will allow the program to complete long calculations in the background while the Mac is used for other purposes.

A still later version of *Excel* will bring its functionality up to that of the MS-DOS version, which at press time was scheduled for release (November 1987). This later version will work with Microsoft's OS/2 operating system, which is a Mac-like, multitasking environment still under development. □

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MacUser EDITOR'S CHOICE AWARD 1·9·8·6

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The PCPC *HD-20 WSI* provides a SCSI interface for *your* Macintosh Hard Disk 20 via an easy-to-install upgrade. In addition to a performance increase of 6 to 10 times and the ability to daisy chain up to seven SCSI peripherals, we provide a fantastic compliment of software, including HFS Backup, PCPC's popular archive and restore utility; Eureka!, the file finding desk accessory; and our ImageWriter and Laser spoolers.

The *HD-20 WSI* consists of a plug-in circuit board, interface cable, and utility software. It is designed for easy installation, as the circuit board uses the existing plug-in connectors and requires no soldering.

With PCPC's *HD-20 WSI* you can take full advantage of the power built into your Macintosh. The *HD-20 WSI* has a 1 year limited warranty and is priced at $295.00. Don't let your hard disk be the weak link of your system, order your WSI today!

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Sometimes A Picture Is Worth A Thousand Words.

It hasn't taken the desktop publishing world long to get the picture with scanners.

Literally overnight, people who haven't drawn anything but a paycheck since grade school have



been able to generate crisp, professional documents with first-rate photographs, illustrations, logos, and other graphics.

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PICTURES ARE JUST
PART OF THE PICTURE.

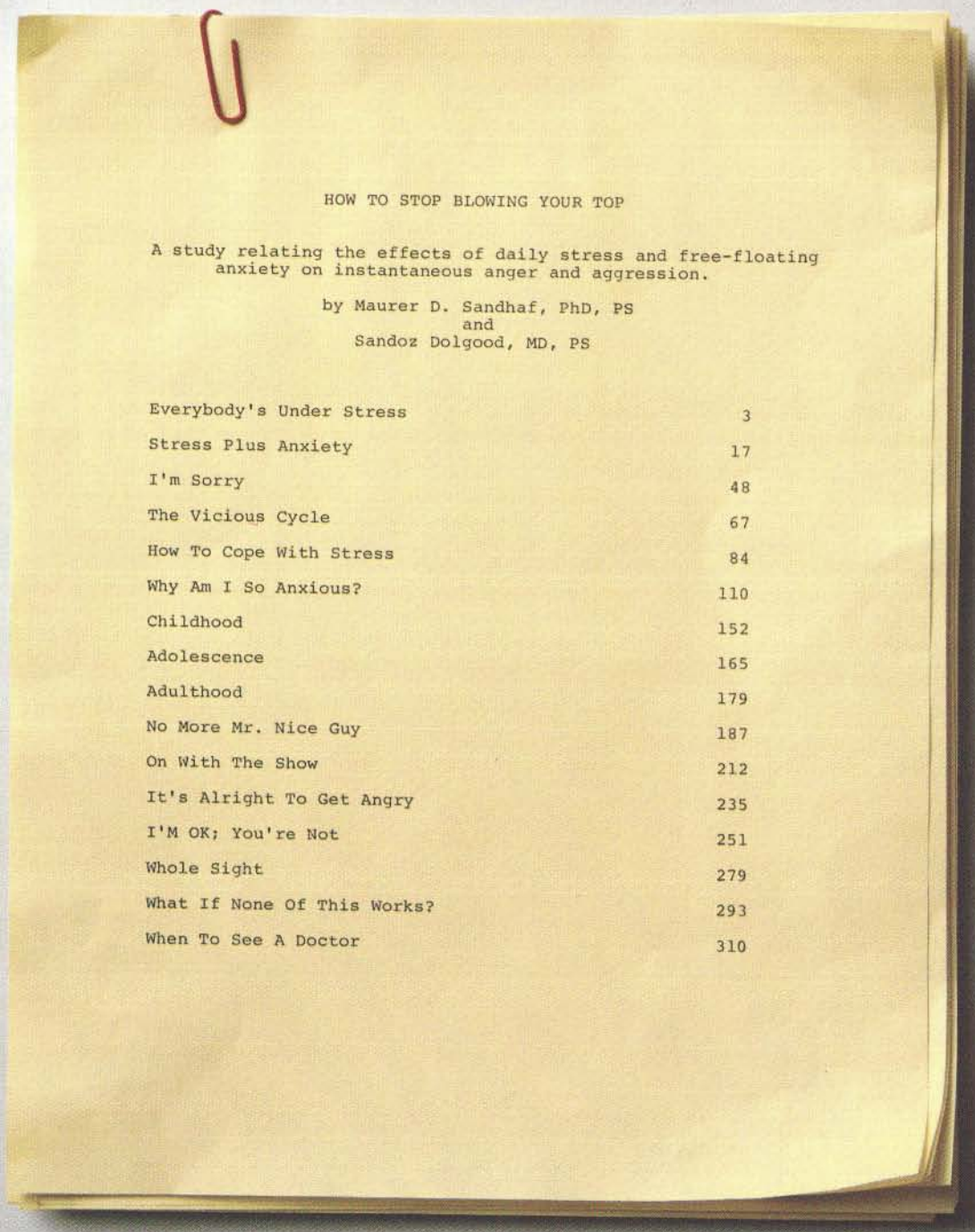
We also scan words. Which happen to account for 80% of most documents.

And when you think about it, that may be an even more valuable asset than our ability to input graphics.

How do you currently enter existing documents into your system? Retype them, right? At 60 or so words a minute?

That's an incredible time drain when you consider that with our PC Scan family, you can scan

Then Again, Sometimes A Thousand Words Are Better.



HOW TO STOP BLOWING YOUR TOP

A study relating the effects of daily stress and free-floating anxiety on instantaneous anger and aggression.

by Maurer D. Sandhaf, PhD, PS
and
Sandoz Dolgood, MD, PS

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an entire page of existing text in the mind-boggling time of 25 seconds, average. We read 600 words a minute.

And those words will appear on your screen the same way they do on the page. With the same tabs, same indents, same underlines, same everything.

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And then transfer everything into your desktop program and start publishing.

Our desktop scanners read more business fonts faster than any other scanner. Including first-pass dot matrix, laser and daisy wheel.

And they're a snap to use, too. One lone keystroke begins operation instead of the multi-stroke formulas many scanners require.

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If you'd like more information on our desktop scanners, call 800-538-7582 outside California. Or 408-946-7100 inside California.

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New VERSION 1.1

THE NEW YORK TIMES:

"MicroPhone is a breakthrough in communications software..."

LOS ANGELES TIMES:

"The program is more sophisticated and easier to use than any...on either the PC or the Mac."

MACWORLD:

"...brings together the best traits of every Mac communications program."

INFOWORLD:

"MicroPhone is the easiest communications package we've seen."

With reviews like these who needs advertising?

They say the best advertising is word of mouth. So we're reprinting some of the multitude of words that have already been said about MicroPhone communications software for the Macintosh.

And what they're saying, universally, is that MicroPhone—created by Dennis Brothers—has far outdistanced all its predecessors. That for the novice, MicroPhone is the simplest telecom software ever devised. That for the expert, MicroPhone is the most powerful.

On-line for the lazy.

MicroPhone gives you the means to create infinitely elaborate macro (automated) routines with infinite simplicity. Its powerful script language is written in plain English, and it also features a recording mode that watches, saves, and repeats what you do. So no programming skills are required.

The upshot is that MicroPhone will save you time, hassle, and on-line fees by automating virtually every operation you now have to key by hand. Log on procedures. File transfers. And, for a good example, E-mail retrieval routines.

At a single command from you, MicroPhone will dial your E-mail service, give your ID number and password. Navigate its way through the labyrinth to your mailbox. Check for mail. Log off if there is none. And if there is, MicroPhone will collect, print, and save all messages to your disk. Then, politely log off.

If you prefer, you can direct MicroPhone to initiate this sequence simply by inserting the disk. Or automatically, at any specified time, day, night. Or at regular intervals.

Anything else you need to do, from collecting stock quotes to sending and receiving files, is just as simple.

Try it out at home or office.

You can find out firsthand just what a remarkable program MicroPhone is. Without risking a cent. We give you a thirty-day moneyback guarantee, no questions asked. Which is virtually unprecedented in software.

Since MicroPhone is not copy protected, we obviously have vast confidence both in our program. And in you.

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MicroPhone™

Communications Software for the Macintosh



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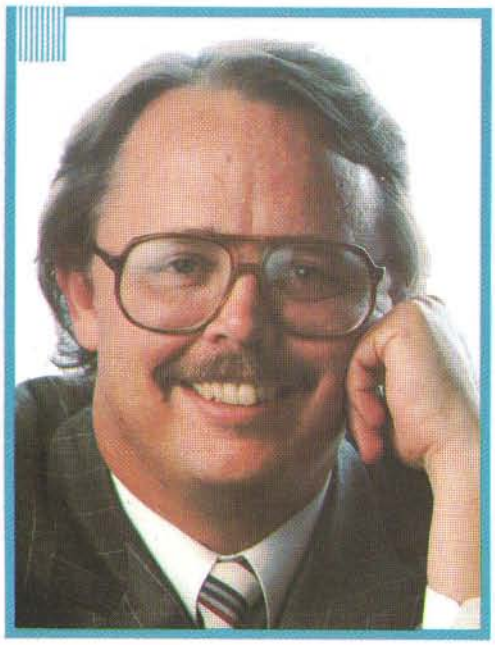
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Circle 625 on reader service card

David Bunnell

The Second Coming of Steve Jobs



Steve Jobs-bashing is in vogue. And Jobs has turned into the Trotsky of high-tech. Grow up, everyone.

The Macintosh is four years old this month, or perhaps I should say four light-years old. We have seen galactic changes in the Macintosh universe since it was first introduced in Cupertino, California, on January 24, 1984, at Apple's annual stockholders' meeting.

I'll never forget the intense euphoria of that night. Inside the packed auditorium at De Anza College, it felt more like a rock 'n' roll revival–as if the Beatles were getting back together again–than a stockholders' gathering.

People were cheering as Apple co-founder Steve Jobs and Apple chief executive John Sculley made their presentations. Then Steve stepped up to the Mac, unzipped the case, turned on the machine, and it spoke to the audience: "Hello, I am Macintosh." Everyone went completely wild.

Macworld spoke that night, too. We were there with the first issue of the magazine. We had been working behind the scenes with Apple for over six months to create *Macworld* magazine. Here was our reward; we passed out thousands of copies to the frenzied audience.

Now the machine was the subject of a magazine "for the rest of us."

Lately, there's been a great deal of looking back at that early period when the Macintosh changed the face of personal computing forever.

There has been a deluge of articles on the subject, along with books like John Sculley's *Odyssey: Pepsi to Apple–A Journey of Adventure, Ideas and the Future* (Harper & Row, 1987), Lee Butcher's *Accidental Millionaire: The Rise and Fall of Steve Jobs at Apple Computer* (Paragon House, 1987), and most recently, the highly readable and fascinating *Steve Jobs: The Journey Is the Reward,* by Jeffrey S. Young (Scott Foresman & Co., 1987).

Most of the press has not been very kind to the man who was the driving force behind the Macintosh. There's been a wave of Steve Jobs-bashing and gloating over his corporate downfall from Apple. In a sense, Jobs has become the Trotsky of high-tech, the foremost ideological outcast of Silicon Valley.

Perhaps our culture, with its *People* magazine mentality, typically lionizes its heroes, then eats them alive. It's part of the food-chain of fame, I suppose. But it sticks in my throat nonetheless.

For example, in *Accidental Millionaire* Butcher (an appropriate name, by the way) writes that "the Macintosh was the first attempt Jobs had at creating a computer and it was a failure."

This cold and untrue statement smacks of historical revisionism at its worst. Even if the original Macintosh was not perfectly executed, it did, beyond any question, set the course for computing in the future–for all personal computing.

If you don't believe me, just look at MS-DOS machines today. You will see pull-down menus, *Windows* software, and icons, not to mention mouse pointing-devices.

When Apple introduced the Macintosh, there was a definite shift in innovation from IBM back to Apple. Earlier, when Apple was still riding high with its popular Apple II computer, IBM brought out its 16-bit PC and stole the thunder from the 8-bit Apple machine. The IBM PC offered more memory, and it had more speed and power. It set new standards for the industry.

Then, Apple introduced the Macintosh at about the same time that IBM brought out its ill-fated PCjr with its Chiclet-style

(continues)



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A screen star is born.

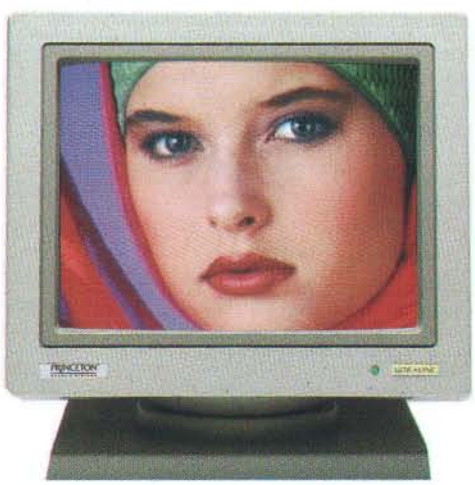
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keyboard. The entire industry perception of personal computing changed once again, in favor of Apple. I firmly believe that this historical shift was the basis for Apple's tremendous performance in the market today. It also remains the foundation for the company's continued success.

Certainly, there were mistakes and miscalculations involved in the marketing and design of the Macintosh. But in no way is the Mac a failure, as Butcher alleges.

Steve Jobs told me he expected to sell 750,000 machines in 1984. It turned out that only 250,000 Macs were sold that year. Even so, this was an incredibly successful sales figure for a brand-new machine, with a totally different operating system, in a market dominated by IBM PCs and clones.

Among the Macintosh's winning features were its small footprint, its carrying case, and its graphics interface. I think those were all brilliant strokes. Even the machine's closed operating system, although it's been severely criticized, was not really an unreasonable idea–at least as far as Apple was concerned.

The Mac's architecture was designed so that all the software written for it would be standard. Developers wouldn't have to worry about multiple printers and various configurations the way they do in the MS-DOS world. Apple had put so much code into the ROM that it was impossible to clone the Mac the way MS-DOS machines were cloned.

In this way, Apple has been able to maintain better control over its machines. More important, it's been possible for Apple to keep prices high and retain better margins. That's only good business sense.

I was also a big fan of the fact that the Macintosh had no fan. A lot of criticism has been leveled at Jobs for not putting a cooling fan into the Mac. But I think that the ability to sit quietly with a computer that doesn't make a loud humming and rattling noise is a definite plus. It allows you to think more clearly and to be much more creative.

Just prior to the release of the original Mac, Andrew Fluegelman, founding editor of *Macworld,* wrote a memo that was widely circulated in the Macintosh division at Apple. In it, Fluegelman urged Apple not to bring out a 128K machine. He recommended waiting until the company was able to release a 512K Mac. Ultimately, as you may recall, Apple opted to unveil the 128K model.

Why didn't Apple bring out a 512K machine at the start? It required larger memory chips. And although the chips existed, they were not available in volume at a price that made sense at the time.

I think there was tremendous pressure on Apple to get the Mac out in time for its annual stockholders' meeting. Apple was so obsessed with turning that event into a major launch for its new product that it probably did itself a disservice by coming out with the 128K model.

In my opinion, the most serious mistake Steve Jobs ever made with the Mac was not in the actual design of the machine. The Mac's Achilles' heel was that it lacked the necessary third-party software support. It was not a technology problem but a personality problem. Jobs was so abrasive that he tended to alienate people–especially the software developers whom he desperately needed to woo.

At the original Macintosh launch, Fred Gibbons, president of Software Publishing, Bill Gates, chairman of Microsoft Corporation, and Mitch Kapor, president of Lotus Development Corporation, all stepped forward to announce that their companies would support the Macintosh with software. Of the three, only Bill Gates actually came through. In fact, he had several programs ready on opening day.

Software Publishing quickly abandoned the Mac. And it took more than a year before Lotus came out with *Jazz,* a program that proved to be a dismal failure.

By contrast, I think that one of the most positive achievements of Apple chairman John Sculley in the post-Jobs era is that he has taken great pains to mend broken fences. He has carefully built good relationships with the infrastructure of the personal computing world. Not just with the third-party software companies, but also with dealers, suppliers, journalists –the entire personal computing community, in fact.

Remember, there were and are a lot of people in the personal computer industry hoping that Apple would succeed with the Macintosh. The truth of the matter is that many industry leaders feared that IBM would come to own all of personal computing.

My friend Dr. Eddie Currie, president of the New York-based software company Lifeboat Associates, made dire predictions about Big Blue at the time. With the introduction of the IBM PC, he warned, personal computing had gone into orbit around IBM. "It's not clear if we'll ever have the velocity to escape that orbit," he worried.

One fear was that Big Blue was strong enough to kill any of its competitors. There was an added danger that innovation could easily be stifled, because no one would dare do anything that wasn't done the IBM way.

Furthermore, IBM was selling directly to many of its corporate accounts, a fact that gave dealers the jitters. Once IBM controlled the software, they reasoned, it would then control everything–including the kitchen sink and all its peripherals.

So there was a genuine receptivity to Apple. But Steve Jobs failed to capitalize on that ground swell of popular support.

Jobs's second biggest mistake was alienating the Apple II division by doing some really dumb things. For example, at the annual stockholders' meetings in 1984 and 1985, staff from the Macintosh division sat in the front rows while people in the Apple II division had to watch on closed circuit TV in another building.

Jobs passed over achievements of the Apple II team, even though Apple II sales were growing astronomically. They were actually bringing in all the company's profits.

Another mistake Apple made with the Mac was introducing it at too high a price. The 128K Mac sold for $2495. This meant that the first wave of buyers were not the "rest of us," as Apple's advertising proclaimed. Rather, they were the personal computing enthusiasts who already owned three or four machines. They were the early adapters–always keen on acquiring the newest, the greatest, the latest thing. Definitely a small niche market.

I don't know what the price-per-unit cost was to market the Mac, but I feel certain that if the product had been priced at $1995, Apple would have sold 750,000 units that first year instead of only 250,000. And the Macintosh would really have quickly become the machine "for the rest of us."

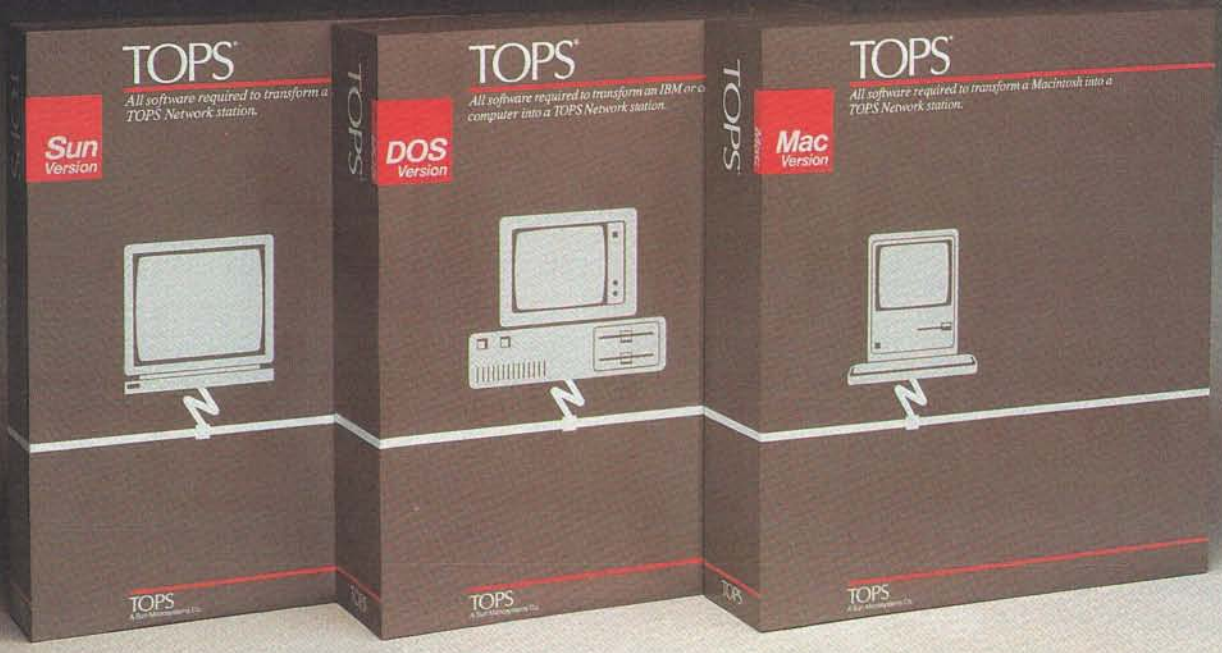
But a lot has happened since 1984. As the Macintosh goes into its fifth year, I see only good things ahead for Apple.

We're seeing a tremendous amount of innovative software emerging. Desktop publishing is booming. We're witnessing great CAD/CAM applications, as well as new and really good database products for the Mac.

I expect we'll see much more Mac technology develop in 1988–especially connectivity solutions, and more communications.

(continues)

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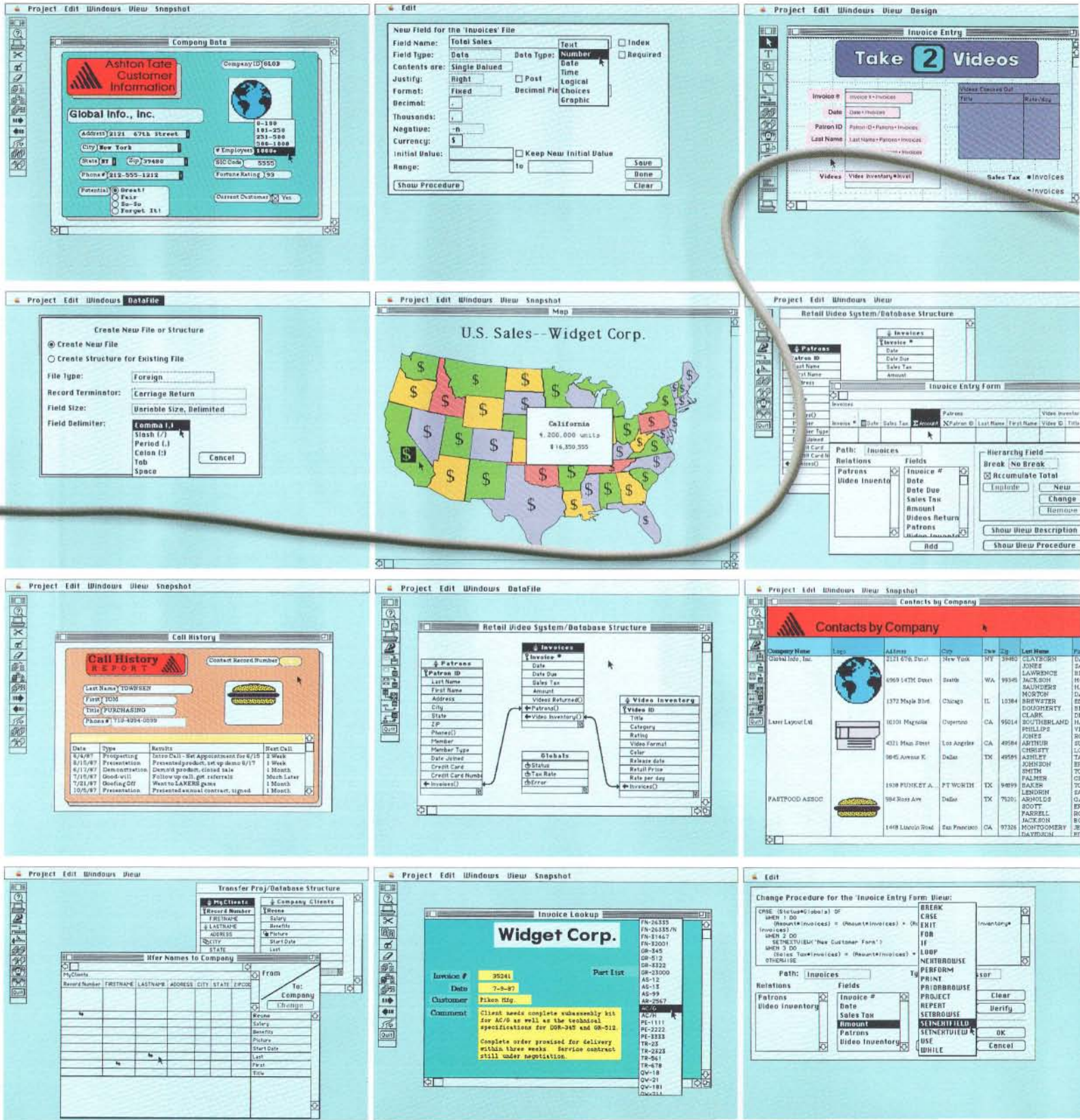
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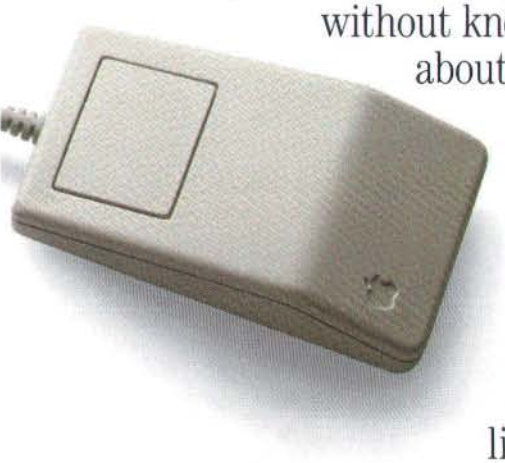


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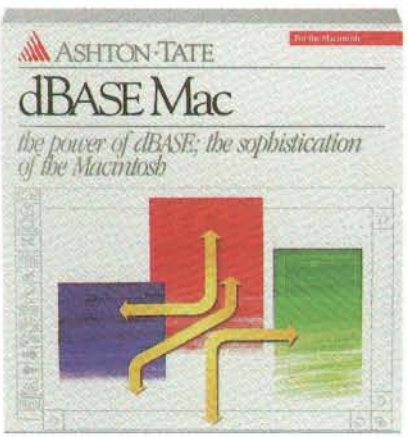
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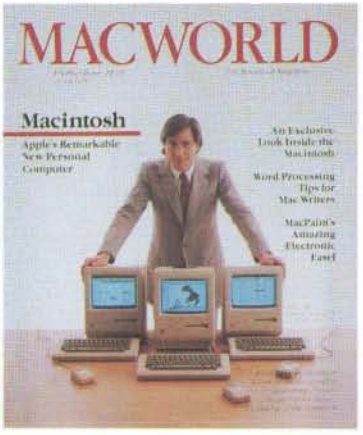
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'Mac-Type People'

Steve Jobs kept changing his mind about appearing on *Macworld*'s first cover. Finally, we got him to pose for 30 seconds. Later, he had us change the images on all the screens of the Macs. Then he called to say he didn't want to be on the cover after all. We told him it was too late and the issue was already at the printer's, which, of course, it wasn't.

We had set up a secret office inside the *PC World* building to work on *Macworld*. We took over the conference room and papered over the windows so that no one could look inside. And we put special locks on the doors. Inside this operations room, we had a team of five *Macworld* staffers working away on two 128K machines. It



was a six-month project that culiminated in the release of the magazine at Apple Computer's annual stockholders' meeting on January 24, 1984–the night that the Macintosh was launched.

Winning Apple's trust and confidence was a close call for *Macworld*. Andrew Fluegelman, the magazine's founding editor, and I visited Apple to make a pitch to publish a Macintosh-specific magazine. We weren't the only ones to make a proposal. Our competition had been there earlier with an elaborate presentation–charts and graphs and slides, and all kinds of pizzazz. But Steve Jobs and Mike Murray, marketing director of Apple's Macintosh division, picked us to create a magazine for what we knew would be a large and passionate audience of Macintosh users. We were "Mac-type people," they said. We took that as a high compliment then, and we still do.

My fondest wish for 1988, though, is that John Sculley, Apple, and Steve Jobs will bury the hatchet.

We've had enough Steve-bashing. I say, give the guy a break. It's difficult to imagine anyone going through so many changes, and becoming so powerful so fast, without having to make some basic character adjustments.

All that Steve really needs to do in order to answer his critics–and what he's likely to do this year–is to bring out his new NeXT computer. I think it will probably set new standards, new directions, and new trends for personal workstations.

Steve Jobs is a technological innovator and an implementer. His greatest skill is not inventing new technology. We're all aware of his shortcomings as an engineer. So what? His gift is finding existing technologies and integrating them in a new package that becomes easily accessible to the widest number of users.

Ultimately, he has been the catalyst for changing the direction of personal computing.

The mouse, *Windows,* pull-down menus, and the graphics interface were invented at Xerox PARC. Steve Jobs and Apple did not invent them. But it was Steve Jobs and Apple that made them what they are today. If Steve hadn't reached out and grabbed those ideas, they would have withered away in some R&D lab, just so many useless and unused experiments.

I suspect that at NeXT, Steve will bring in some components and technologies that we haven't seen packaged before in personal computers. As usual, he will probably do that in interesting ways that will raise the stakes of personal computing.

Some industry insiders have sarcastically predicted that the NeXT machine will be a "super-yuppie machine" with great graphics and sounds, and that's all. Whatever it may be, I look forward to it with great eagerness. Because I will wager that when the NeXT workstation does come out, suddenly people will be amazed by Steve Jobs all over again. The fickle media will become more sympathetic, and they'll start to build him back up to his former glory. Perhaps no longer as a wunderkind, but a wundermensch.

I hope that from all this turmoil a new Steve Jobs will emerge–a more grown-up and diplomatic person. We may actually witness his second coming in 1988. But I don't think that this triumph means he is going to eclipse Apple. Apple will continue to be successful, huge, and magnificent. Steve will be a winner in his own right.

Jobs's critics may truthfully declare that Sun Microsystems and Apollo Computer invented the workstation, that they laid all the technological groundwork. But Steve Jobs will be the one who plays a major role in making workstations popular and accessible for the rest of us.

He will be the Merlin who gives workstations imagination and transforms them into the machines of the nineties and beyond.

Rest assured, Steve Jobs will be back one day soon. We still need him. He still needs us.

Have an insanely great 1988! □



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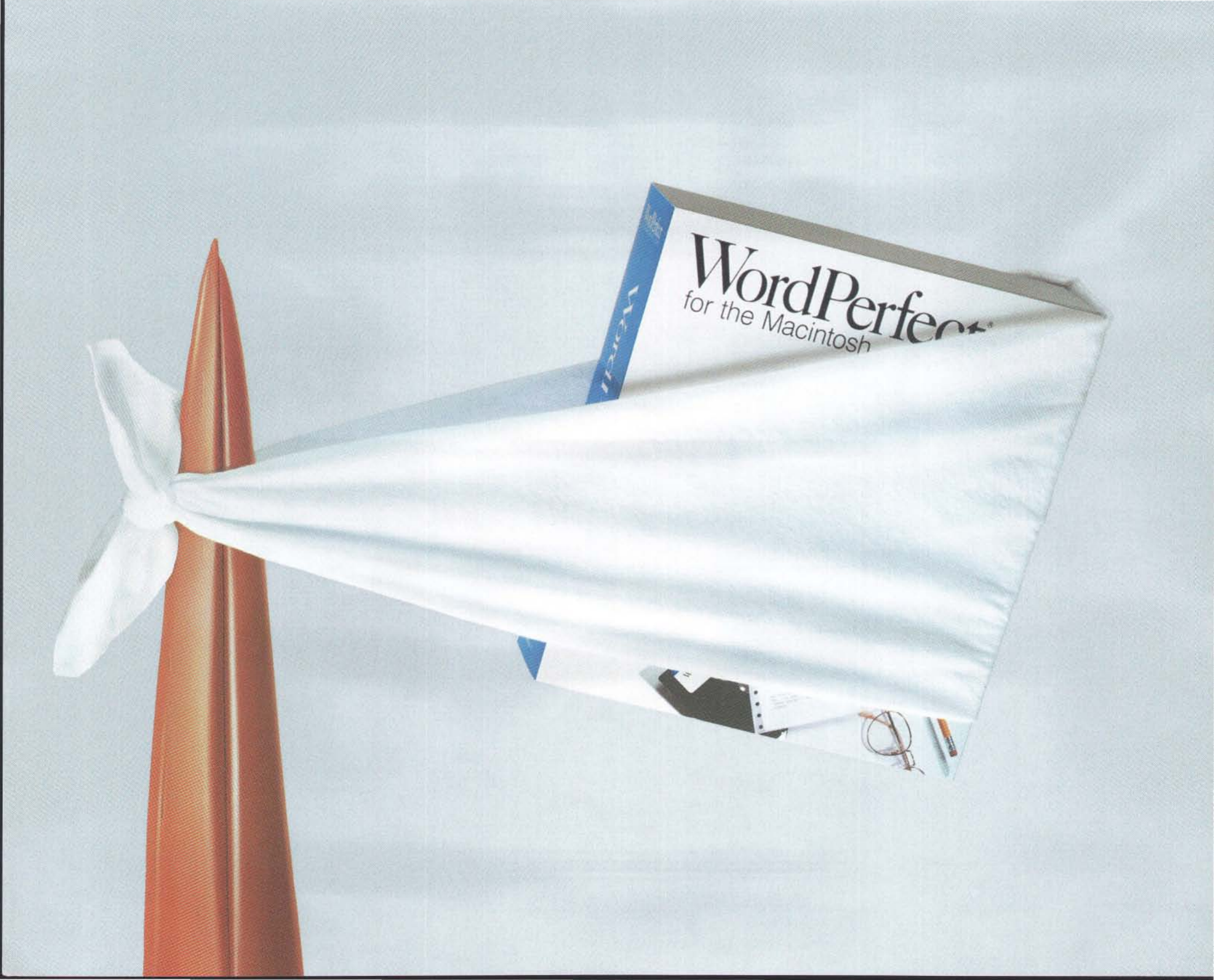
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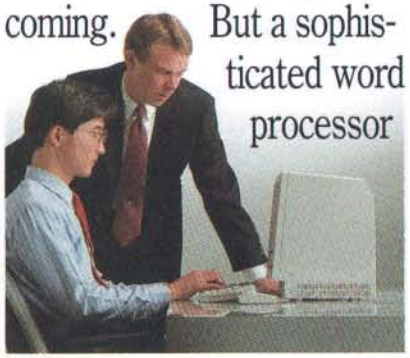
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WordPerfect's new arrival that wasn't born yesterday.

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Yes, it was a long time coming. But a sophisticated word processor



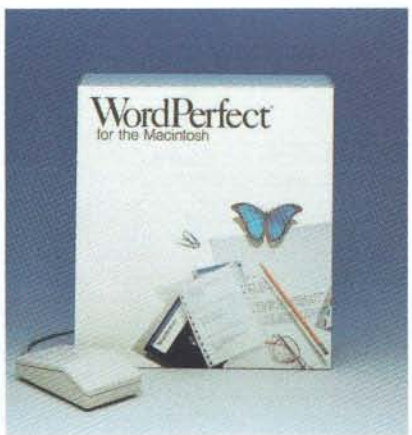
doesn't just drop from the skies. It takes time. Time to create a true Mac mouse interface that also has the built-in versatility of keystroke equivalents in main menus and submenus. Time to implement exclusive WordPerfect features such as on-screen text columns,





(Left) Create up to 24 on-screen text columns, with snaking or screen-writer column options. Put them anywhere in your document, any time you like. (Right) Store the tasks you do frequently—with no limit to number or size—and call them up instantly via mouse or simple keystroke commands.

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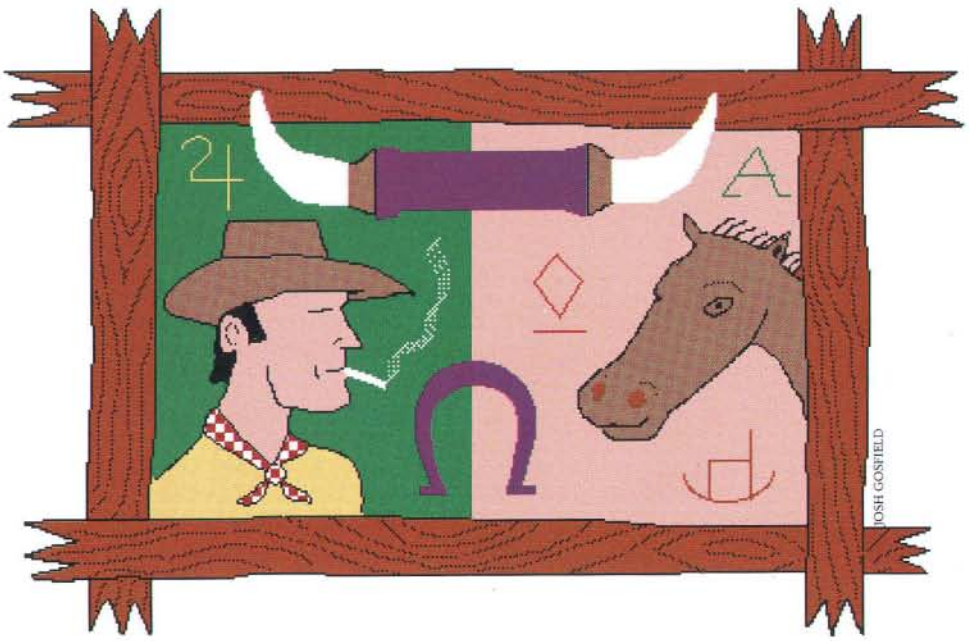
Letters

A forum for Macworld readers

Cattle Call
Cattle ranching, like all agriculture, needs the high-tech capabilities of the Mac; unfortunately, I've had trouble locating any livestock-management packages. Could you furnish a list of suppliers?

James A. McAllen
Linn, Texas

The Macintosh Buyer's Guide lists two suppliers of agriculture-management packages: Hutchinson Computer Industries in Minnesota (612/587-2940) and Dapple-Tech Computers in Maryland (301/490-1200). Data Sources *lists AG Plus Software in Iowa (712/364-2885) and Digipac in Saskatchewan, Canada (306/765-1707). Heizer Software in California (415/943-7667) sells an* Excel *template for swine management.–Ed.*



Corrections
MacLink Plus *suffered a case of mistaken identity in* Commentary *and in "Business Buyer's Guide" in the November 1987 issue. The file-conversion program is published by DataViz of Norwalk, Connecticut, 203/866-4944. MacViz is a real-time video digitizer made by Pixelogic (formerly Microvision) of Stoneham, Massachusetts, 617/438-5520. Our apologies for the confusion.*

Our August 1987 Updates *contains a listing for* Trapeze *1.1, which was never actually released. The current version, 2.0, has been released and is described in this month's* Updates.

*The address for Diehl GraphSoft (*Updates, *August 1987), maker of* MiniCad, *is 8370 Court Ave. #202, Ellicott City, MD 21043. The price for registered users is $19; $495 suggested retail price.*

Rare First Edition
As someone with seven years of experience in the printing and graphics business, I think "First Edition" (August 1987) is the best single article I have ever read for preparing people to deal with printers. Pointing our customers to the article as a primer saves us hours of explanation.

Richard R. Hausfeld
Madison, Wisconsin

The Printer Sees Red
"First Edition" contains enough inaccuracies to cause consternation in the printing community. Some examples: "The camera reads red as black." Many electrostatic camera-platemakers are more sensitive to blue. "Presses do not print to the edge of the sheet." Maybe not a sheet of maximum size, but they *can* bleed three sides of a smaller sheet. "Paper costs can constitute as much as 50 percent of your final printing bill." A good grade of offset paper should account for only 8 to 18 percent.

And don't worry about getting burned by a hand waxer–mine heats wax to about the temperature of warm tea, and I have resisted the impulse to wax my hands for nearly 14 years.

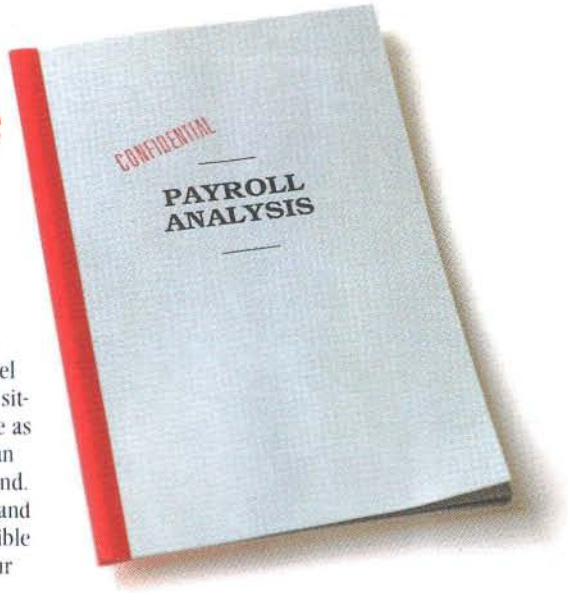
H. B. Smith
Pronto Print, Inc.
Bristol, Rhode Island

Suzanne Stefanac responds: "Several printers and seasoned publishers I've interviewed said they've seen paper costs go over half the budget. As for bleeds, I merely cautioned new publishers to consult with printers before doing one, particularly when it falls on the top of a page, since that's usually where the press grips the page."–Ed.

(continues)

Would you leave this document out on your desk?

Then why leave it unprotected on your disk?

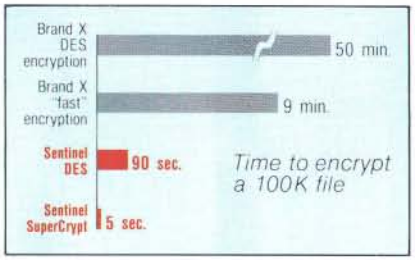


Everyone creates confidential documents — payroll analyses, bids, personnel records, to name a few. But documents sitting on the Mac desktop are as vulnerable as papers left out on your desk. Anyone can access your files when you are not around. And with the increased use of hard disks and networks, your data is now more accessible than ever. You need a way to guard your private documents from prying eyes.

SENTINEL: Password Protection and Encryption.

SENTINEL is a data encryption utility that lets you lock your documents right on your desktop. Since password protection is easily circumvented by the determined intruder, Sentinel uses password *and* encryption strategies to protect your documents.

For encryption (which actually scrambles the data on your disk), Sentinel presents a choice of two methods: *DES* or *SuperCrypt*™. Both offer speed as well as security. Our DES encrypts a 100K file in less than 90 seconds, SuperCrypt in just under 5.



Sentinel's two encryption methods, DES and SuperCrypt, are so fast, they leave the competition in the dust.

Standard Macintosh Format.

Documents encrypted by Sentinel remain in standard Macintosh file format. They can be backed up, copied, transmitted over networks, or sent to remote sites by modem. But unlike all of the other files on your desk top, they can be unlocked and read only by someone possessing the correct password.

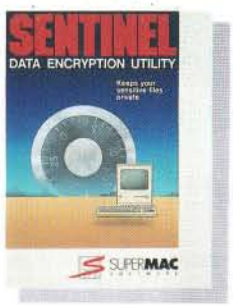
Easy and Natural to Use.

Sentinel also makes working with your secured files more convenient. Creating *Sets* of files allows you to protect multiple documents efficiently. You can add or delete documents to a Set, and Sentinel will lock or unlock them all with one password.

The *WorkSet* feature remembers which files have been opened at any time during a work session, and gives you a quick lock-down capability. Sentinel was designed to be unobtrusive and easy to use, making file security a natural work practice.

Price: $295.00.

Minimum system requirements: Macintosh 512e



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Letters

Flawed Performer

I was outraged to discover that several advertised–and fully documented–features were not implemented in Mark of the Unicorn's *Performer* 2.1 upgrade. Enclosed in the promotional material urging registered users to buy the upgrade was *Macworld* author Christopher Yavelow's glowing review of the product, which has considerably lowered my faith in his objectivity and reliability.

Mark W. Phillips
Athens, Ohio

Christopher Yavelow responds: "I granted Mark of the Unicorn permission to quote my review after publication. Because of space limitations, the review was never published so I was surprised to learn it had been quoted. However, the prerelease version I tested was, for the most part, fully functional. Although some features were later disabled for the 2.1 release, the product's accompanying letter acknowledged this and promised buyers they would soon receive a fully operational update." Yavelow has since received a copy of Performer *that conforms to the one he reviewed. –Ed.*

Sounding Off

I was excited to see our *Sound Lab* waveform editor for the Ensoniq Mirage reviewed in your July 1987 issue. Although the review was quite positive, Erik Holsinger thought the product too expensive and the manual inconsistent with the program's newest features. Since then we have fully updated the manual for our latest version (1.2) and have reduced the price from $399.95 to $299.95. We just wanted you to know we're listening.

Donny Blank
Blank Software
San Francisco, California

Default Finding

I realize your review of *miniWriter* in the September issue couldn't go into detail about its defaults, but the Smart Quotes feature is one of a number of options, including font and size, that can be permanently set. Admittedly, configuring the defaults requires *ResEdit*, but the process is detailed in the documentation.

David Dunham
Maitreya Design
Goleta, California

(continues)

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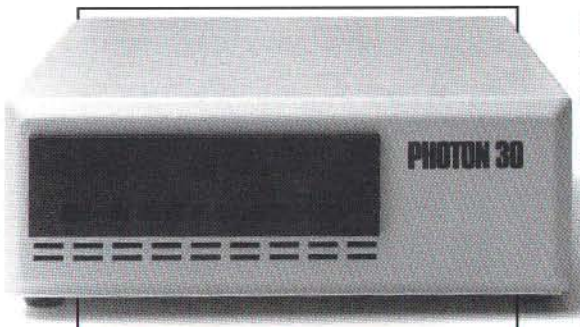
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*This price includes a rebate of $100.00 if you return the 800k floppy drive to us in our pre-supplied box. P20i, P30i and P45i without rebate $599.00, $749.00, $999.00 respectively.



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The 2001 is a combination 20Mb hard drive/20Mb tape drive. *MACazine said our tape backup "software is topnotch and simple to use, the benchmark times are very good and the drive is quiet.*

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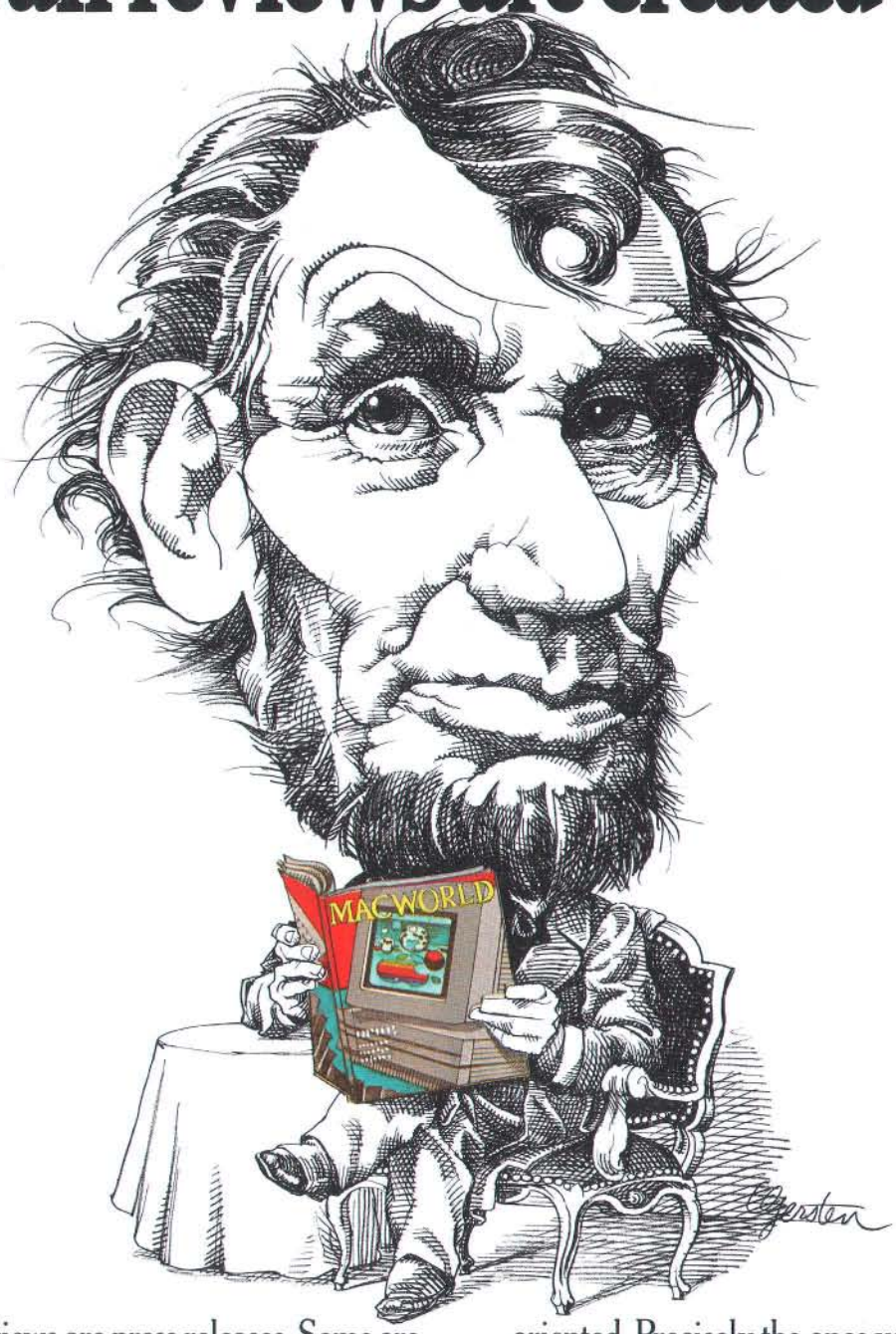
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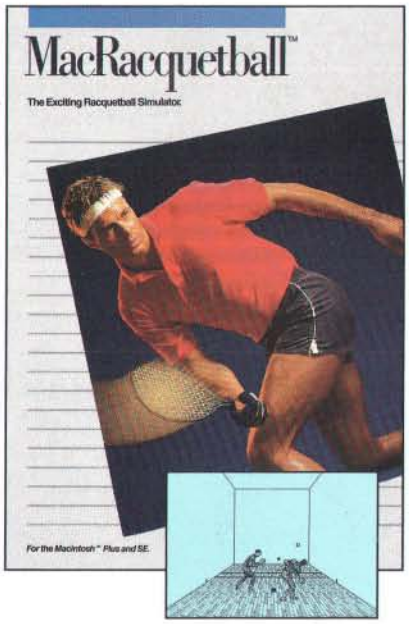
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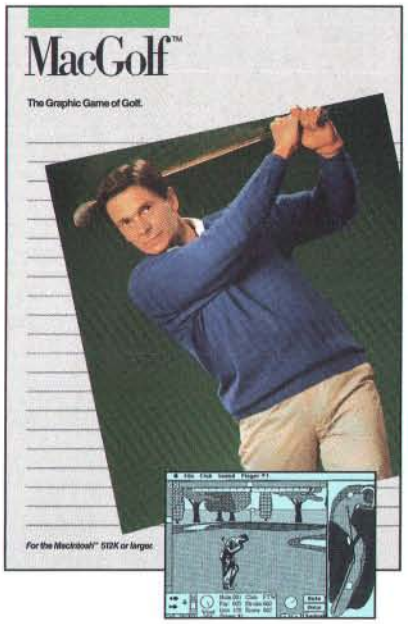


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Even if you've never been on a racquetball court, you'll spark to the excitement of this challenging simulation.

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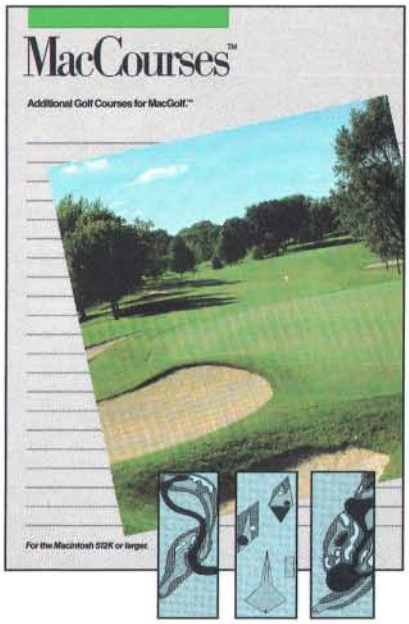


Enthusiastic players everywhere have made MacGolf the best selling Macintosh game ever.

MacGolf puts you in the picture, a full perspective 3-D simulation of realistic golf action. You match your skills against fairways, roughs, bunkers, water hazards, sand traps and trees.

MacGolf gives you a player's eye view of the course, in any direction, and an aerial overview of each hole. You have complete control of your position, ball placement, ball speed and direction, and selection of all 14 clubs. Digitized graphics and sounds add to the excitement.

MacGolf is so close to the real thing it will improve your golf game. And by the time you've reached the eighteenth hole you'll know you've been in a real contest.



When you have the best selling Macintosh game in the world, what do you do for an encore?

Here's new turf for adventurous MacGolfers. These are courses to conquer for mouse wielding pros who have taken the measure of the original MacGolf courses.

If you liked MacGolf, you'll love what MacCourses brings to the screen. Four new 18 hole, par 72 courses: Cedar Creek, Golden Sands, Thunder Ridge and PCAI International. The fairways, traps, hazards, and putting greens of MacCourses are in a whole new league.

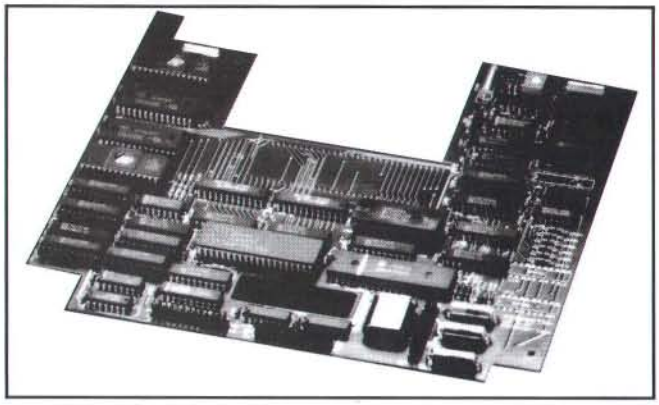
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Letters

Restricted Access

In the September 1987 issue of *Macworld,* David Bunnell revealed that the FCC is eyeing an "access charge" that would directly affect individual users, who can least afford it. I oppose this punitive surcharge and concur with Bunnell's suggestion that the FCC start a bulletin board so that it can run a more "open shop." Rather than free up the marketplace, enacting this proposed fee would represent a move in exactly the opposite direction.

Collis Davis
Brooklyn, New York

Data Exchange

Many mainframe databases can read and write ASCII files. Why don't Mac databases provide this feature to aid import and export of data to and from other programs?

Duane D. Kiser
Aiken, South Carolina

Our database expert Jim Heid answers that virtually all Mac database managers–from simple filers like Record Holder Plus *to relational development systems like* dBase Mac *and* 4th Dimension*–can exchange data with other programs via ASCII (text-only) files.* FileMaker Plus *can read and write tab- or comma-delimited text files, while* dBase Mac *reads and writes text files with fixed or variable-length records and supports six different field-delimiting characters. As a mainframe user, you might want to examine Odesta's* Helix VMX, *a VAX-based version of* Double Helix *that provides access to databases for networked Macs.–Ed.*

Sales Pitch

The letter in your August issue from Ted R. Swanek asking about software to record sales leads prompted us to respond. We designed *C.A.T.* with this very idea in mind, to track business contacts. I hope it will benefit other frustrated salespersons who want to use the Mac more effectively.

Debbie A. Bartunek
Chang Laboratories, Inc.
San Jose, California

Compiling Headaches

In using Borland's *Turbo Pascal* 1.00A, I've discovered what I believe is a fatal error in the compiler. Under certain (as yet undetermined) conditions, Boolean expressions involving relational comparisons yield inconsistent results. Borland's technical staff

(continues)

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NEW from Satori Software

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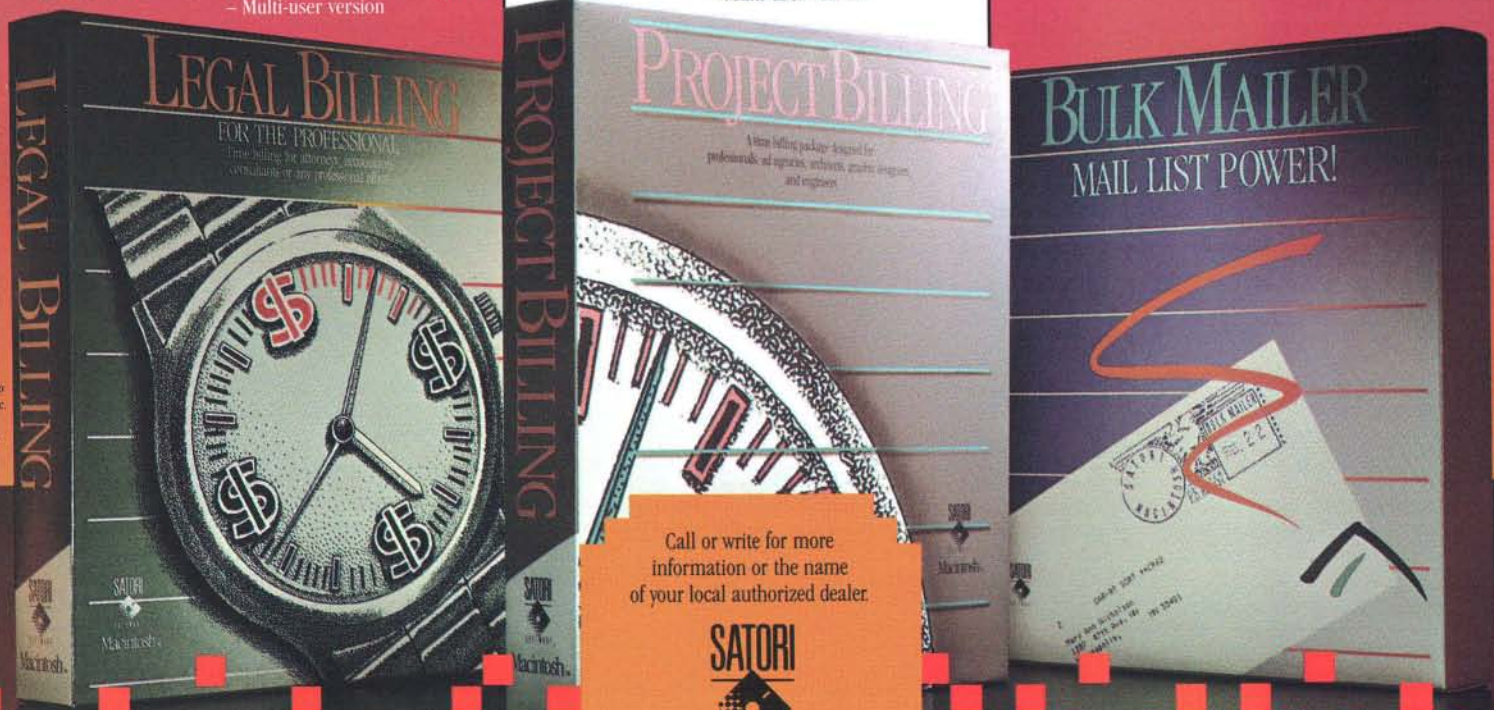
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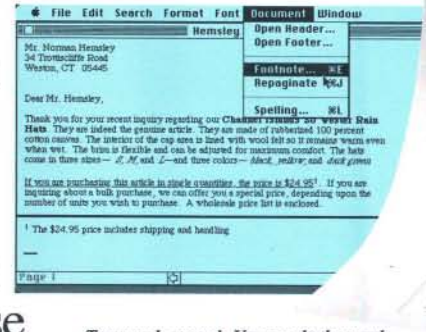
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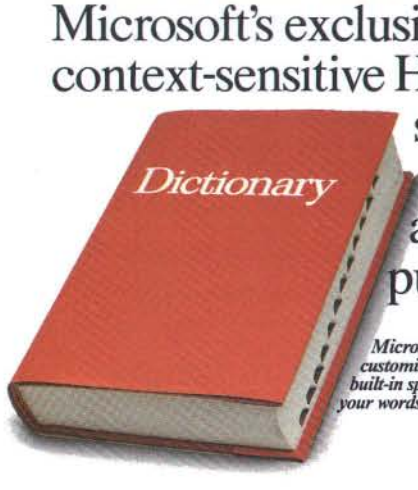
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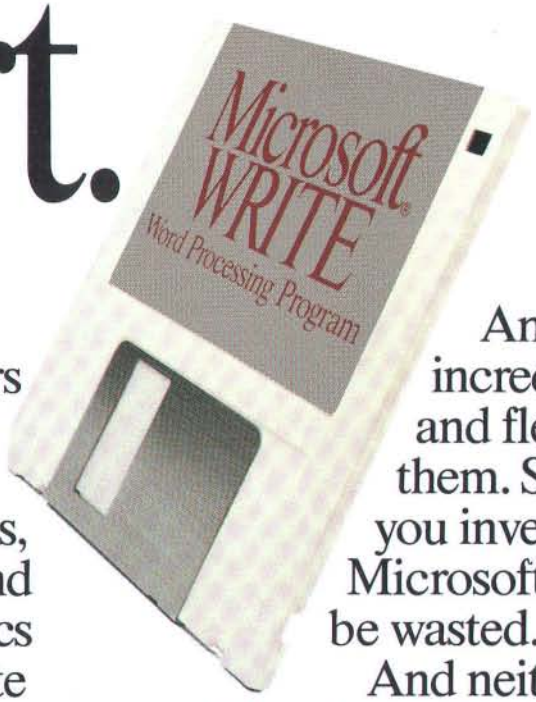
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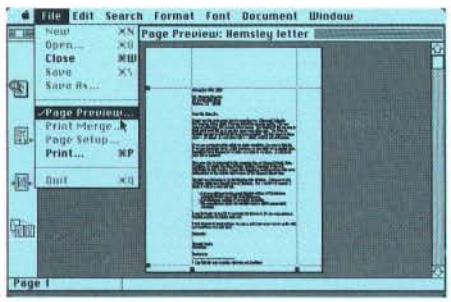
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acknowledged the problem but could supply neither a fix nor a workaround. Please alert your readers so that they can save themselves some headaches trying to debug correct code that's executing in an incorrect compiler.

Keith R. Barker
Mountain View, California

Borland says it has since fixed the problem in an upgrade and has been sending out free replacement disks to users who've reported the bug.–Ed.

The Great SE Debate

As an Apple dealer, I must refute Steven Levy's claim ("Macintosh SE: The Great Compromise," *Macworld* September 1987) that the SE's slot is not needed because dealers can connect circuitry to the Plus. While it may take ten minutes to install a board in the SE, in the Plus it can take hours. Levy laments the high cost of an upgrade if and when the SE begins to use the 68020, then says Apple should have boosted the price by including it in the first place.

Further, the SCSI port speed and the 15 to 20 percent increase in operating speed are more than just "a little faster." Levy is finding fault where there is no fault to be found.

Robert L. Hyde
Coon Rapids, Minnesota

Tarnished Magic

To update your review of our MagicDrive hard disks (*Reviews,* September 1987): the drive's new software does include a head-parking utility, and some time ago we extended our six-month warranty to one year. In addition, we object to the MagicDrive's comparison to the SE's internal hard disk, since our drive was tested using a Mac Plus, which is slower than an SE.

John Kinnaird
MacProducts USA
Austin, Texas

All comparisons–except the one with the SE–were against other drives tested on a Plus. Incidentally, the time-to-duplicate test using the Jasmine 80 drive showed a minimal 8 percent speed difference between the Plus and the SE. –Ed.

North of the Border

Are there any Mac user groups in Canada that distribute public domain software?

Mario Bellabarba
Sherbrooke, Quebec

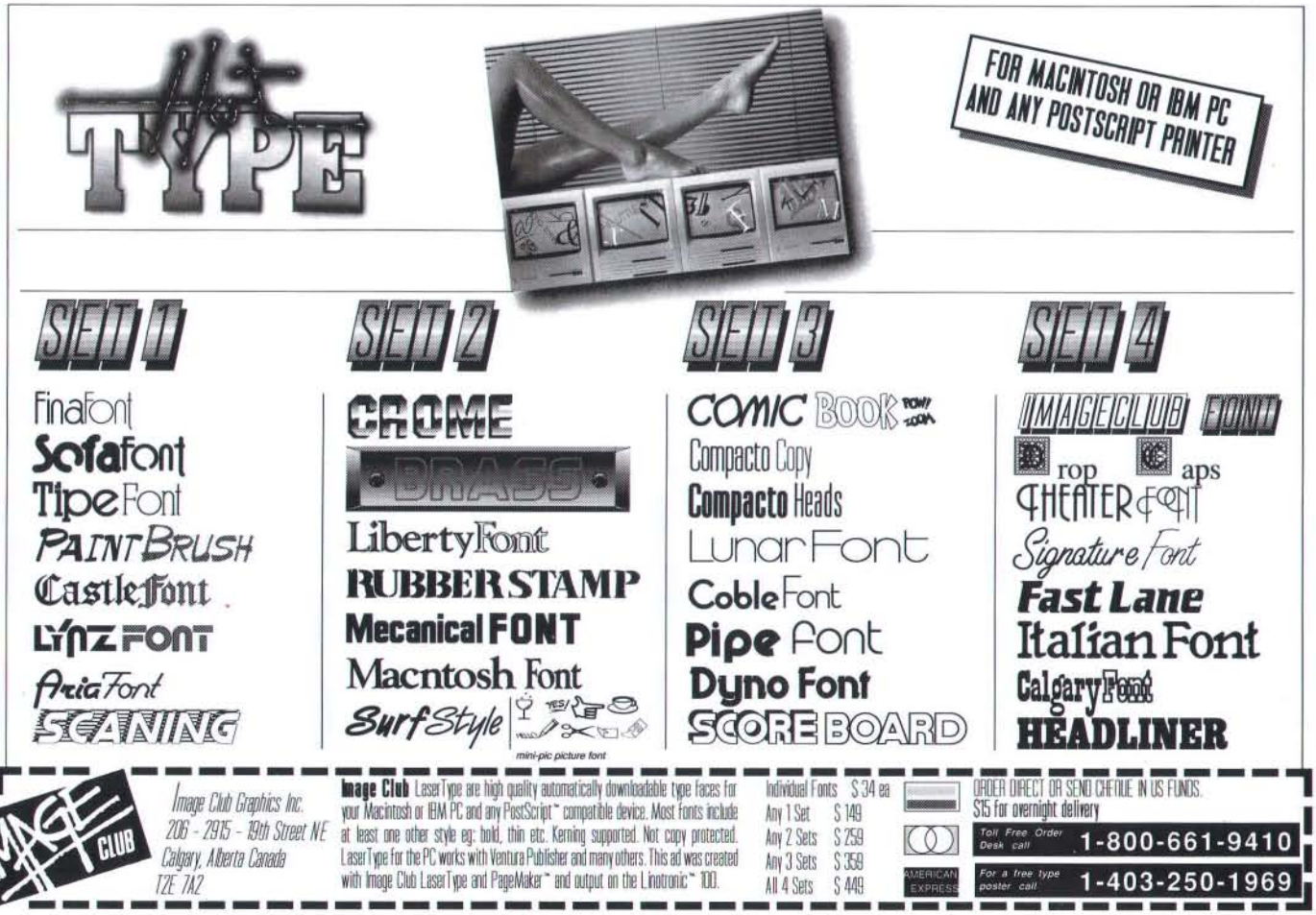
The only group we found was Apple Canada in Markham, Ontario (416/477-5800). Perhaps that group can put you in touch with others we don't know about yet.–Ed.

Rough Draft

SuperSpool 4.0 has some nice features, but it doesn't do draft mode. Is there a conservation-of-bugs law? It seems that Microsoft has fixed its draft-mode bug at about the same time SuperMac has found a new one.

Jerry DaBell
via AppleLink

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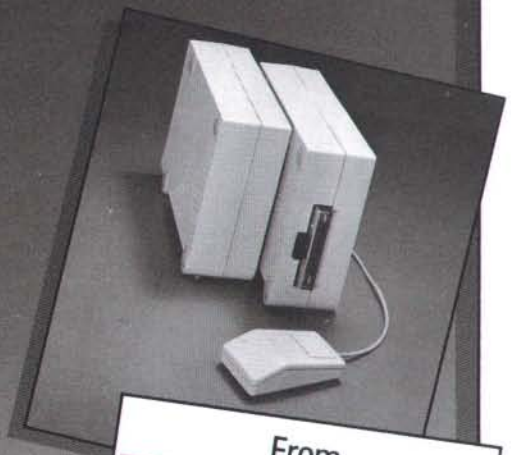
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Michael Day
The Macintosh Journal



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The Macintosh Journal

Cirrus Drives

The Cirrus drives are exciting and excellent performers. They offer impressive speed, flexible software, attractive design and quiet operation.

Ease of Use

Running a Cirrus drive is very simple. It is just a matter of plugging the drive in and turning it on. The drives come pre-formatted and ready to go. The Cirrus has two DB 25 connecters on its case, so its cables are easier to work with than the "standard" SCSI cables that come with some drives. The design of the Cirrus drives contributes greatly to their ease of use.

The software that comes with the Cirrus drives is very flexible. It follows the Macintosh interface closely, and is well done. With the software, users can partition the drives into several volumes, or combine several drives into one single volume. Volume sizes can be changed or new ones added at any time without losing data. Password protection, manual or automatic mounting, automatic head parking, backup utilities, and disk repair utilities are all standard. In addition, the software performs several diagnostic tests including the ability to map out bad sectors and program the drive's interleave. In short, this is some of the most extensive and best written software available for Mac hard drives.

Most of the Cirrus' flexibility comes from their excellent software. However, the physical construction of the drives also contribute to their superior flexibility. Unlike other drives for the Mac, Cirrus drives can be placed vertically or stacked horizontally depending on your desktop requirements.

Performance

Cirrus drives were engineered to perform well in everyday situations. These drives are very fast when performing common operations such as going to the chooser or building the desktop. Reading and writing to and from files is also very fast. Using the Cirrus drives gave us an appreciation of the importance of ergonomic design to performance. For instance, fan noise can increase fatigue in office workers. A drive that is built to be quiet and easy to work with may not increase the data transfer rate, but it will help to get more productivity out of the user. Cirrus drives are quiet and easy to work with which we consider to be a plus in their performance rating.

Because the Cirrus software is so good, users may want to use it to initialize drives from different manufacturers. In our tests, this worked well, and allowed drives of differing origin to be linked together as one volume. Since many of the older SCSI drives came with poor software, this is a good argument for buying a Cirrus drive and chaining it with other drives after they have been initialized with the Cirrus software.

Design and Construction

The Cirrus drives, though very small and lightweight, (about 4 lbs.), are constructed of quality materials designed to last. Their light weight is due to the small number of components in each drive and to their plastic case. The Cirrus drive is both sturdy and durable; the internal power supply is encased in aluminum, and the drives are shock mounted on rubber bearings.

The Cirrus drives have the most exciting, simple and elegant design we have seen in a hard drive for the Macintosh. The modular construction of the drives means that any repair work will be quick and easy. Simply put, Cirrus drives are a joy to work with.

Recommendations

Cirrus drives were designed for the the professional user. They were not engineered to be low cost products, or to be "just adequate performers;" they are built with premium components. These are powerful drives with powerful software. Cirrus drives are an excellent solution for users who demand a lot. Readers should also note that several new products are in the pipeline and that a 40MB tape backup and 30MB hard drive are currently available. We give the Cirrus 20, 40 and 60 drives an excellent rating (8 on a scale of 10) and recommend that other drive manufacturers follow the Cirrus example, and design drives that are simple, elegant and impressive performers. *-Michael Day*

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See us at San Francisco MACWORLD Expo.

Commentary/Jerry Borrell



Thanks for the Memory

It's MultiFinder! Do you know where your memory is?

"It quit."

"What quit?"

"Excel."

"Excel?"

This, I thought, does not bode well. A newly upgraded Mac Plus with a large screen, running the latest version of MultiFinder, sits on the desk of Jane Lagas, our Editorial Manager. She uses it for budgeting, planning, author contracts, and more. Thirteen megabytes worth of information. This is a machine that we cannot afford to have acting up.

"Ah. Maybe it's MultiFinder."

I pull down the Special menu, and select Set Startup. So far so good. Select the Finder option in the dialog box. Then restart. No icon in the upper-right corner, so we're in the Finder. And, yes, *Excel* opens up. Talk about a rude awakening. A Mac Plus upgraded to 2MB cannot run MultiFinder and *Excel*.

True, *Excel* is a notorious memory hog. True, Jane does run large spreadsheets on her system, and the display screen needs sufficient RAM to support a full 1024-by-780 screen buffer. But the implications.

I had only just managed to convince my management that we needed to have several of our Mac Pluses and Mac SEs upgraded to 2MB. Eleven upgrades. We managed to buy the memory for about $6000. (We bought the memory from an Apple developer, before Apple had lowered its price for 1MB to about $599.)

Incredible. Two megabytes is not enough. Not that 2MB has any particular connotation, but I had thought we'd be "power users" with that amount.

I already knew that 2MB on the Mac II is insufficient. For our first demonstration of Interleaf's electronic publishing program for the Mac, the company had to bring 4MB of memory to add to our Mac II just to show us the package. I also remember the demonstration of Microtek's new 8-bit scanning software that wouldn't work properly with only 2MB. Then there's my trouble with Bravo's *MacCalc,* the spreadsheet that I use for planning: it quits frequently–"Out of Memory."

Come to think of it, SuperMac's *Pixel Paint* does something similar, but less rudely. When I try to launch the program on my machine, I get a dialog box politely informing me that there is insufficient memory to use the package, but would I like to open it with the memory available? At least I can use the program. On the other hand if I try to open a large picture file, the program opens only the application, not the picture.

Having faced the fact the the Mac II is a 5MB-base machine–that is, it needs that much memory to run many of the new programs I try–I could accept a 2MB minimum for the Plus and the SE. In fact, I noted in this column a month ago that the Plus/SE family was moving to a 2MB base. Finding that even this amount may be insufficient was frightening.

There are several implications, but for the first time as an administrator I was facing a very contentious issue. How can I afford to upgrade the memory of the 20-plus Macintoshes in our department? And if I do, is 2MB enough or do we need more?

Of course, memory sellers should be in heaven.

But wait. Do I recall a demonstration of MultiFinder that showed how to minimize the amount of memory used by applications? I plow into the documentation (blissfully straightforward). It says to open the System Folder and select About Finder. (It never says MultiFinder in the About box, even when you're using MultiFinder.) A little chart pops up that tells me how my system's memory is distributed: 224K to *WriteNow,* 160K for the Finder (I assume this is the combination of the Finder and MultiFinder), and 409K for the System.

A good start, but is there actually a way to indicate how much memory I must dedicate to each application? Read on. If you select an application while in MultiFinder and then request Get Info from the File menu, an updated dialog box opens up showing two new entries: the amount of memory Apple recommends you allocate for the application and the amount of

(continues)



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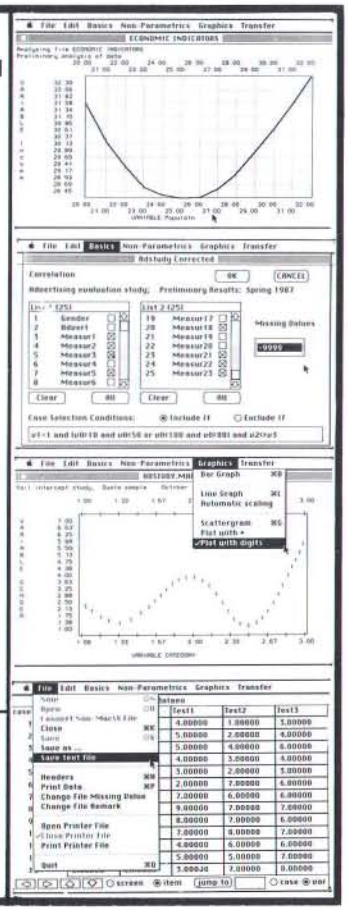
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memory you choose to devote to the application.

Let's say for example that I want to run *WriteNow* and *Pixel Paint.* I'll just keep on writing this column (saving first) and try the aforementioned procedure. Well, *Pixel Paint* needs an additional 1677 bytes; it won't open. So I'll adjust the memory used by *WriteNow.* That's odd, the suggested memory size doesn't appear in the Get Info box for *WriteNow.* I expect we'll see a lot of those discrepancies until developers catch up with the new System and Finder.

Maybe another application; how about *Excel?* I'll try a big file, say a 286K list. No luck; won't open. A blank *Excel* file does open. But I can't get at that list. Hmmm. I'll consult the Finder memory distribution box once again. Let's see: *Excel* 272K, *WriteNow* 224K, Finder 160K, System 430K.

As I sit pondering this, I have creeping memories of past experiences. Like the time I installed my first hard disk on an IBM PC. But this is the Macintosh. I didn't fall in love with this computer to have to partition my memory each time I open up a desktop full of applications. I don't want to understand fragmentation of memory that may prevent me from opening this or that application. The Mac should take care of this. I don't have time to play hacker/enthusiast with my Mac these days—I do too much work with it.

So the simple solution is to buy enough memory to avoid the issue. At least that appeared to be the answer until I discovered that even 2MB doesn't do it. And if I resolve this dilemma, I still have to worry about the potential for overheating the system board with all of that memory.

The Mac II is another story. The shortage of 1-megabit memory chips has postponed upgrades for the Mac II until recently. True, the cheaper 256K RAM chips are available, but they have a problem. It takes four times the chips to add an equivalent amount of memory, making it impossible to put the maximum 8MB on the Mac II system board. Also, until recently the Mac II had a 1MB limit per slot. The latter problem has been solved with a change in the Mac II's ROM, allowing developers to build cheaper memory cards for Mac II slots. It hardly seems a coincidence that Apple should lower its memory prices as this becomes possible. Whatever the marketing implications, at last we have memory coming for the Mac II.

(continues)

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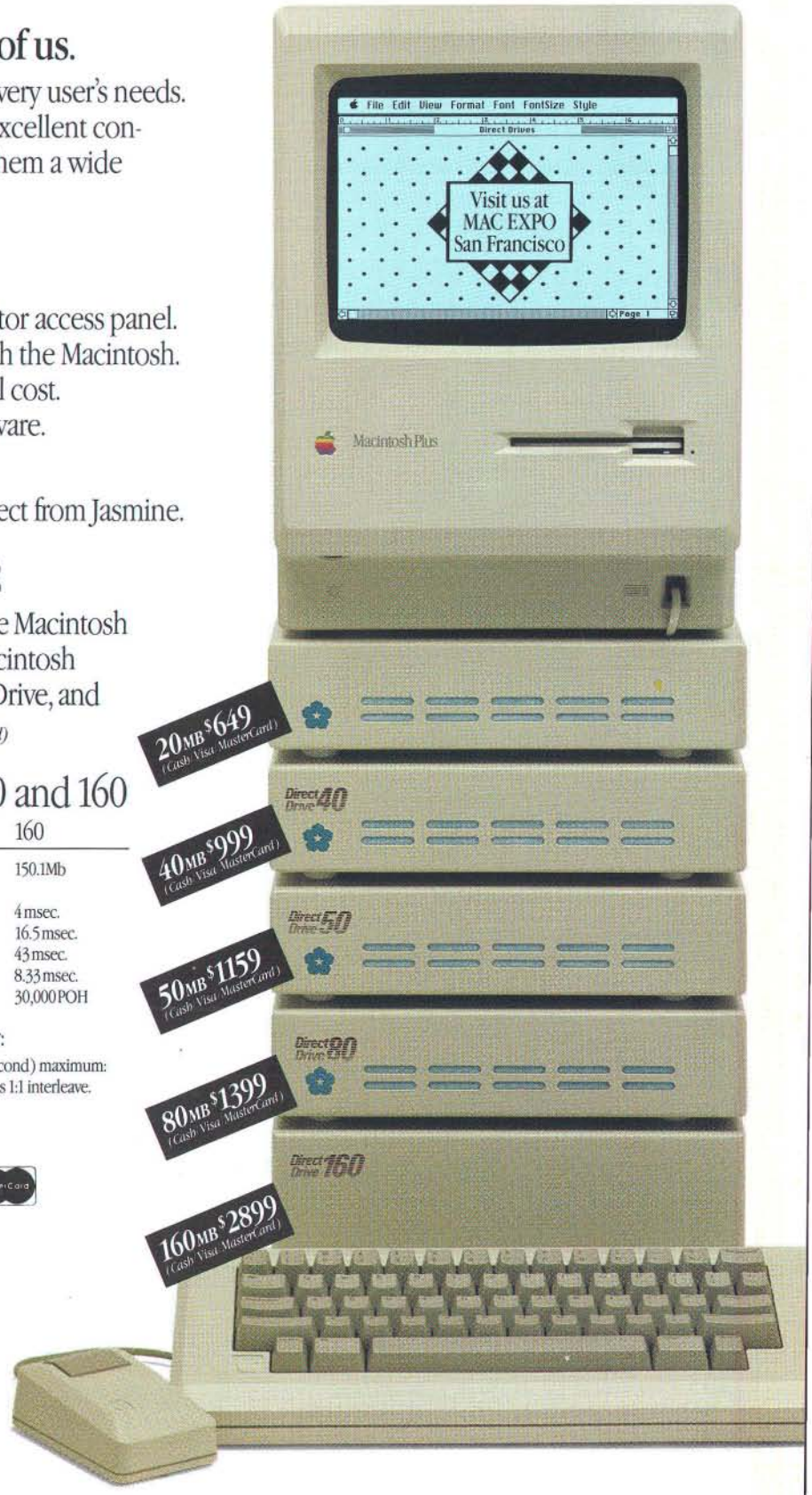
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Commentary/Jerry Borrell

Nor are these the only difficult situations facing administrators using Macs today. Take networks for example. Already we at *Macworld* are faced with the need to add a staff position to administer our network. At present Eileen Drapiza, our New Products Editor, takes care of this, but she's growing ever so tired of having to drop her work when the hue and cry goes up that "the network went down" or "the printer won't." Witness a recent five-day episode during which the LaserWriter appeared like a will-o'-the-wisp in our machines' Chooser boxes. The culprit was, of course, a nonterminated AppleTalk cable that runs to our art department. That discovery was of little solace to Eileen or to Senior Associate Editor David Ushijima, who lost valuable time playing network sleuths.

The solution is to add an individual to staff whose task it is to help upgrade System software and the latest drivers and keep the network working. But that's an expensive solution.

There is good news from the front. With Apple's release of MultiFinder, which will be sold at dealers for about $50, we no longer have to worry about updating specific files in the System Folder. Now you insert the floppy disk, select Install, select the CPU that you intend to install the new software on, and select Install again. The installer replaces what it needs to. That's right—no more System-version hieroglyphics other than the single version number. You do have to boot the Mac from the new software disks, install, and then restart, but that seems a trivial inconvenience by comparison.

One light comment on the state of Mac affairs. You should write to Educomp (listed in the introduction to *Where to Buy*) for its library of start-up sounds for the Plus and SE—every cult classic imaginable. They automatically sound off whenever you start up the Mac.

Someone should build a library of dialog-box sounds. The next time I get one of those "Out of Memory" dialog boxes, I'd like to have something like the Klaxon from Epyx's *Sub Battle Simulator:* "Prepare to dive!" □

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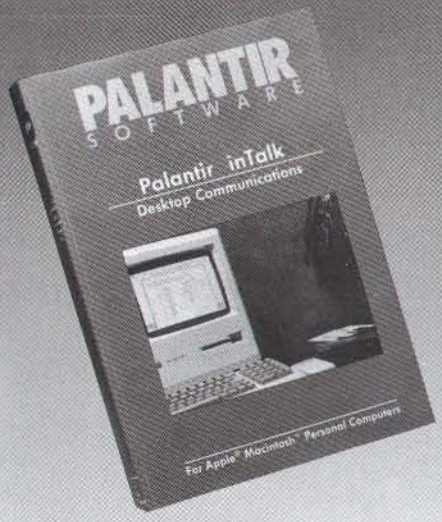
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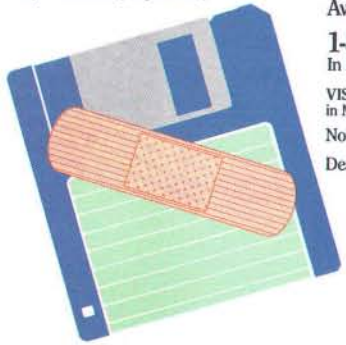
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Contributors Notes

Michael Alexander *("HELP!" and "Mac Charting Tools") is an* Excel *spreadsheet jockey who bought a Macintosh soon after covering the machine's debut for* Newsweek. *Ever since, he's helped friends, acquaintances, and even strangers on the street solve their hardware and software problems.*

Danny Goodman (Business Clinic) *has been writing about computers since the 1970s and has used the Mac since before its release. A* Macworld *contributing editor, he is the author of* Hands-on Excel *(Scott, Foresman & Co., 1986) and* The Complete HyperCard Handbook *(Bantam Books, 1987).*

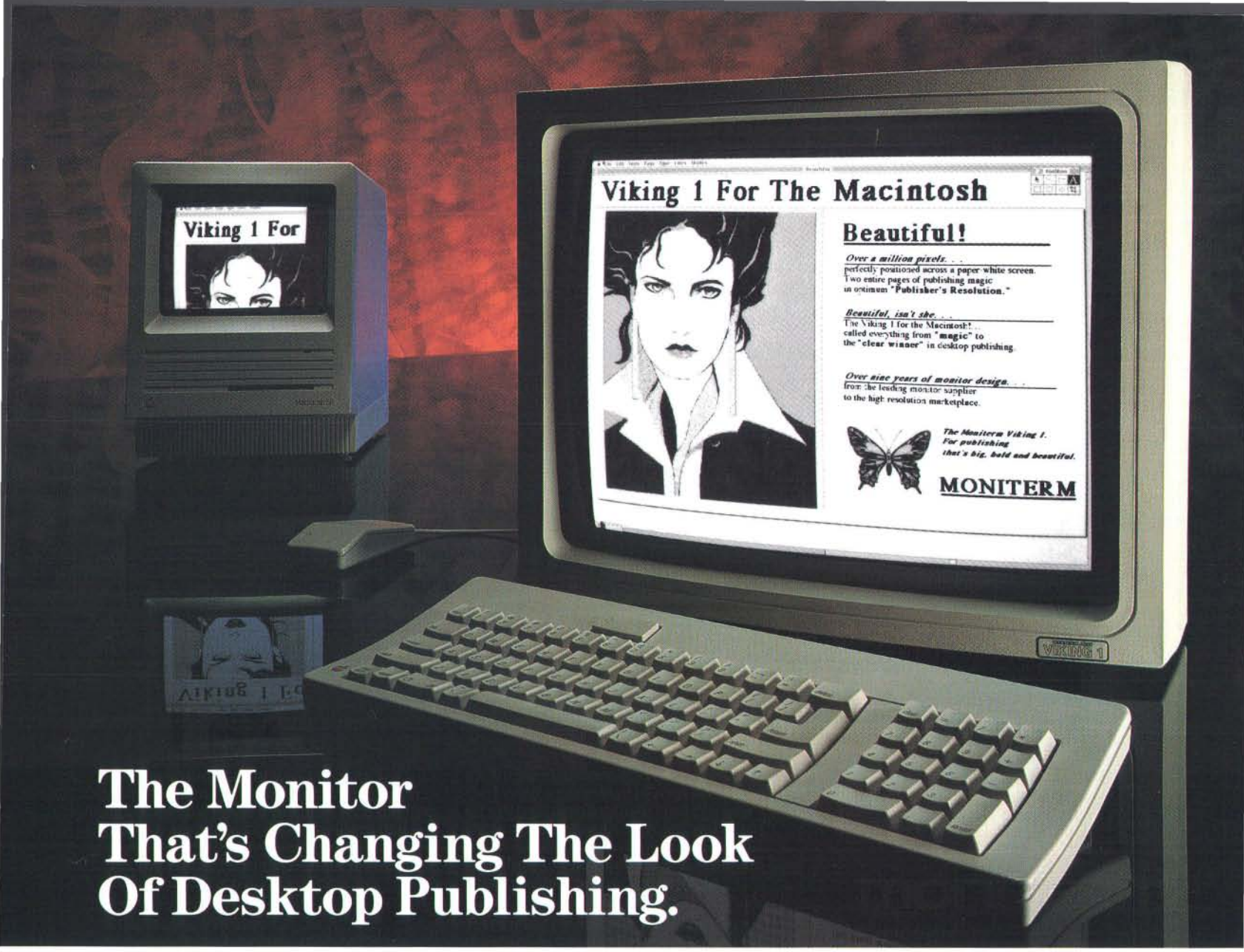
Bruce Maurier *("Insights on Adobe Illustrator") is an editor and illustrator with Publishing Power, a Palo Alto, California, desktop publishing firm. Since the day* Illustrator *shipped, he has been using it to produce commercial and technical art.*

Jim Morton *("Shades of Gray") is a San Francisco printer and desktop publisher who produces* Pop Void, *a periodical about modern culture, using* PageMaker.

Erfert Nielson *("The PostScript Difference") was a founding member of the* Macworld *staff. She put her art-school training to work and quickly became a Mac graphics specialist. Currently doing free-lance writing in Hollywood, she is probably the only writer in town not working on a screenplay.*

Lon Poole (Quick Tips) *has been educating Macintosh users since the machine was introduced. In his monthly column he answers questions and offers advice. A collection of these tips can be found in his book,* Mac Insights *(Microsoft Press, 1987).*

Kevin Rardin *("Insights on Adobe Illustrator") is a desktop publishing and technical communications consultant. He's also the author of* Desktop Publishing on the Mac *(Plume/Waite, 1986), which won the 1986 Computer Press Award for the Best How-to Book.* □



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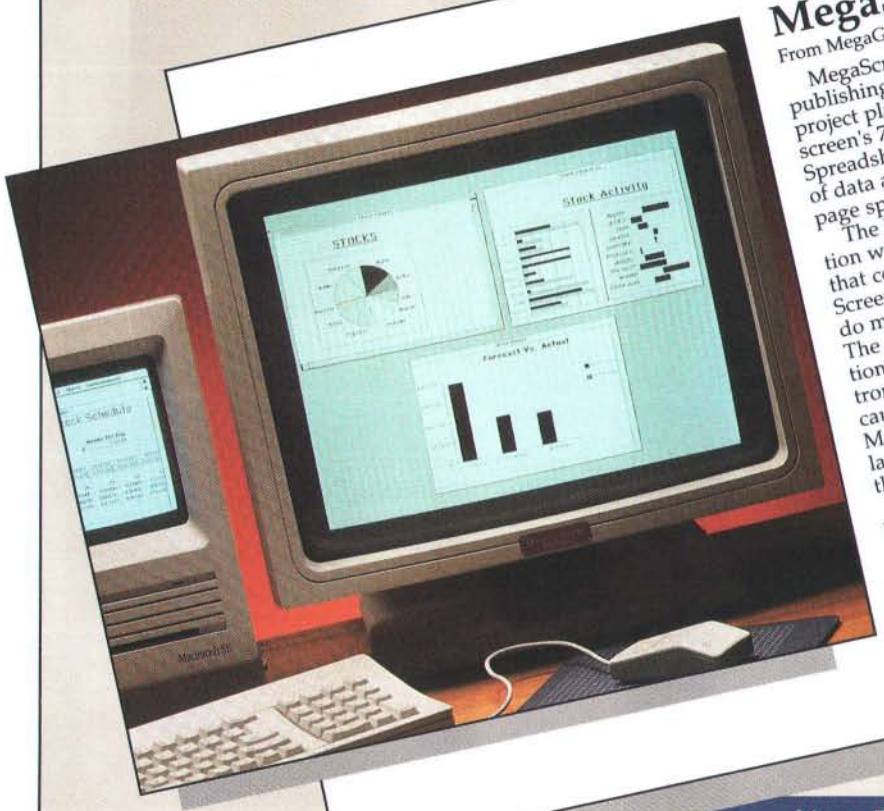
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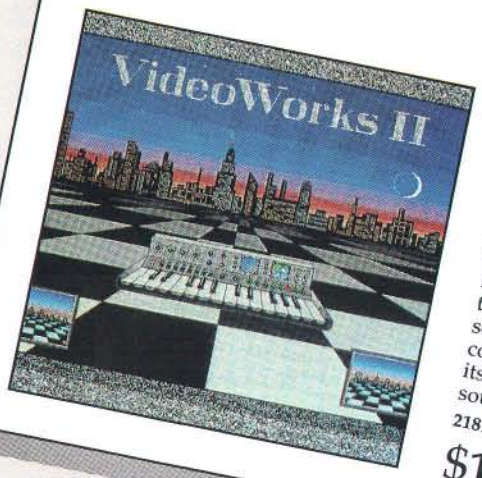
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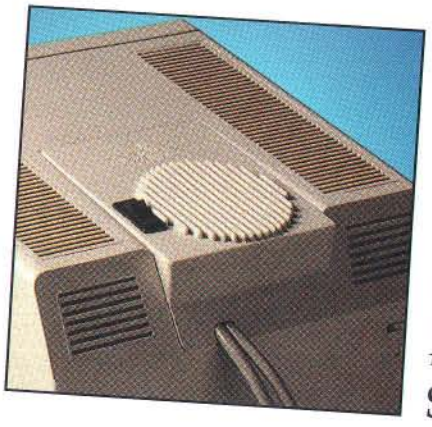
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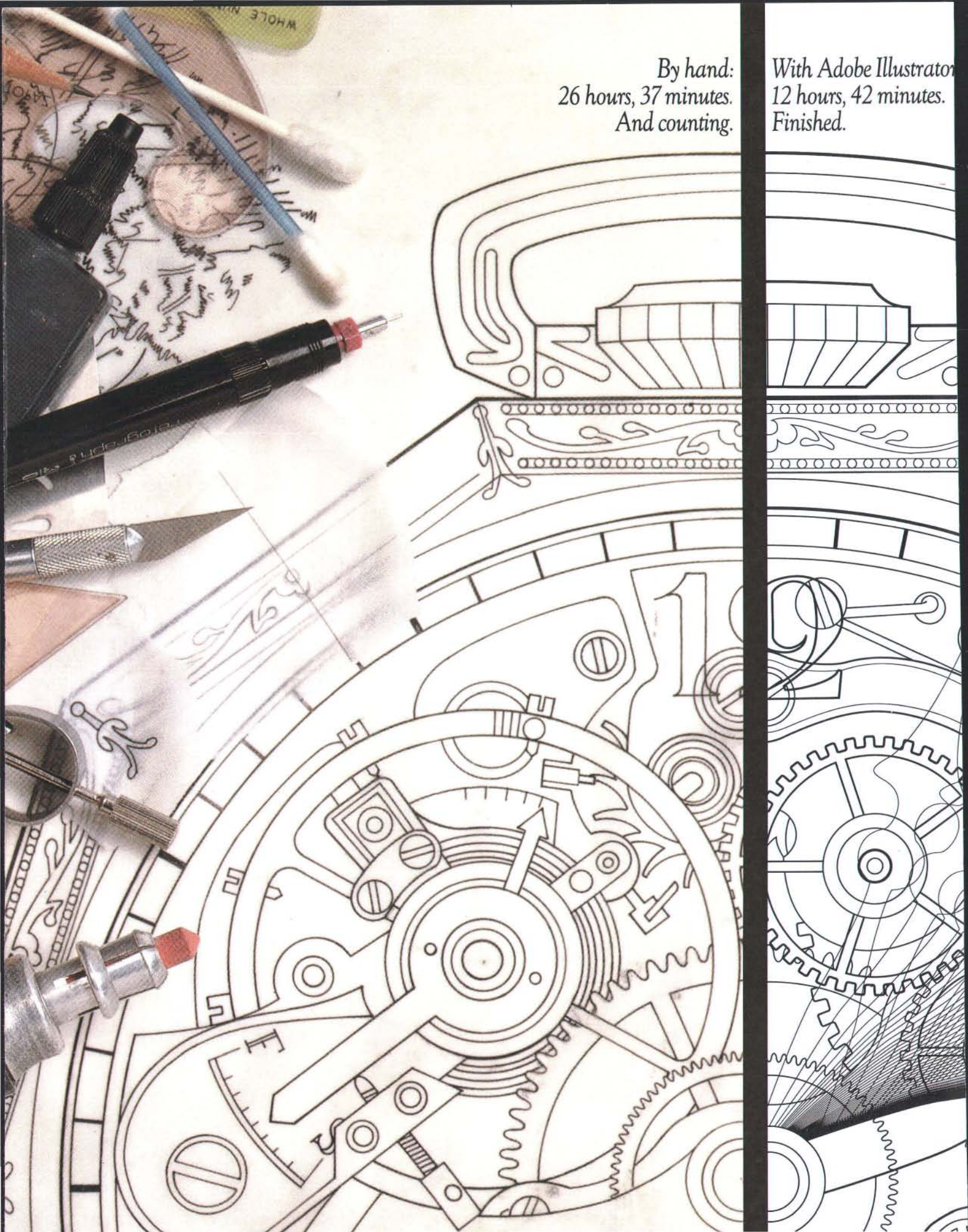


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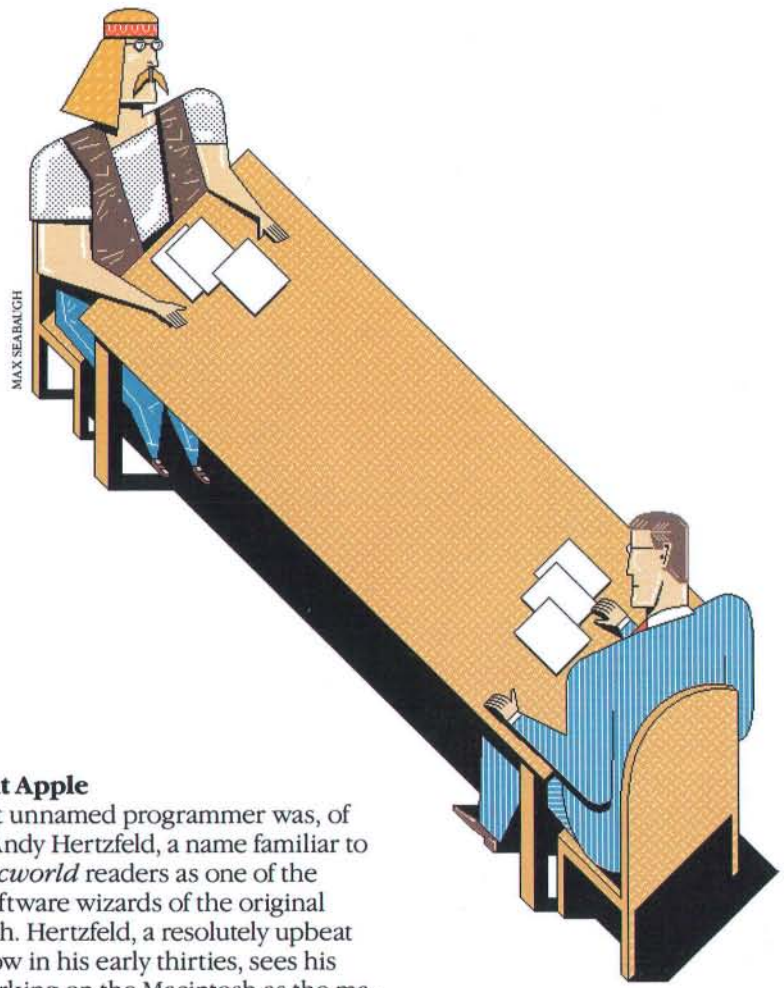
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Steven Levy

Tales of the MultiFinder

Behind the new system software is a controversy that cuts to Apple's core



MultiFinder made its debut at last summer's Macworld Expo, an event that will ultimately be remembered as the high-water mark of the Macintosh. The crowds were reminiscent of the 1982 Comdex, when people suddenly realized that microcomputers were not only real, but growing explosively, and those who got in then would reap big bucks. In 1987 the Bayside Convention Center was teeming with people in business suits who smelled money in the Mac.

The most talked-about product was *HyperCard,* which I'll discuss in another column. The most *important* product was MultiFinder. This program, a sort of super-Finder, provides the illusion (and, in many cases, the advantages) of running more than one program at a time; and it embodies the past, present, and future of the Macintosh. It has enabled Apple to smugly proclaim superiority over the IBM world, which can only promise a similar product sometime in the future. By that time, Apple executives hinted, an enhanced version of MultiFinder would preserve Macintosh's technological head start.

But the MultiFinder story, like the Apple Computer story itself, is bittersweet. Its resonances, its strengths and shortcomings, are, almost as if genetically determined, inextricably linked to the controversial Apple character. One could easily detect this heavy baggage when the product was introduced by Apple's technology czar, Jean Louis Gassée. The French-born executive felt compelled to insist that none of the programming code used in the MultiFinder was held in common with code written by a former Apple engineer for a similar program that had somehow gained notoriety. It was an odd remark, a seemingly gratuitous insult. But as we shall see, it cut to the truth of the matter.

Split Apple

That unnamed programmer was, of course, Andy Hertzfeld, a name familiar to most *Macworld* readers as one of the prime software wizards of the original Macintosh. Hertzfeld, a resolutely upbeat fellow now in his early thirties, sees his years working on the Macintosh as the major event in his life thus far, and he takes inordinate pleasure in seeing people make the most of the computer he helped to create. Andy Hertzfeld doesn't work at Apple anymore, but his Macintosh love affair has lingered; in the past few years he has devoted his talents to writing products that will enhance the Mac and help it in the marketplace.

While his goals would seem to match Apple Computer's, the company's relations with Hertzfeld have been ambivalent. Some personal clashes might have contributed to this, but the heart of the matter is that Andy represents the Old Apple of the hackers—flaky, scruffy, passionate, and irreverent. The New Apple sees itself as energetically committed, but also professional, reliable, well-dressed, and in tune with the needs of conglomerates and robber barons. The New Apple likes the luster of its rambunctious youth, but wants the world to know that it has grown up.

The other problem with Andy is that he is associated with the reign of Steve Jobs. The former chairman and cofounder is still Apple's unwelcome Ghost In The Machine, and no amount of success seems

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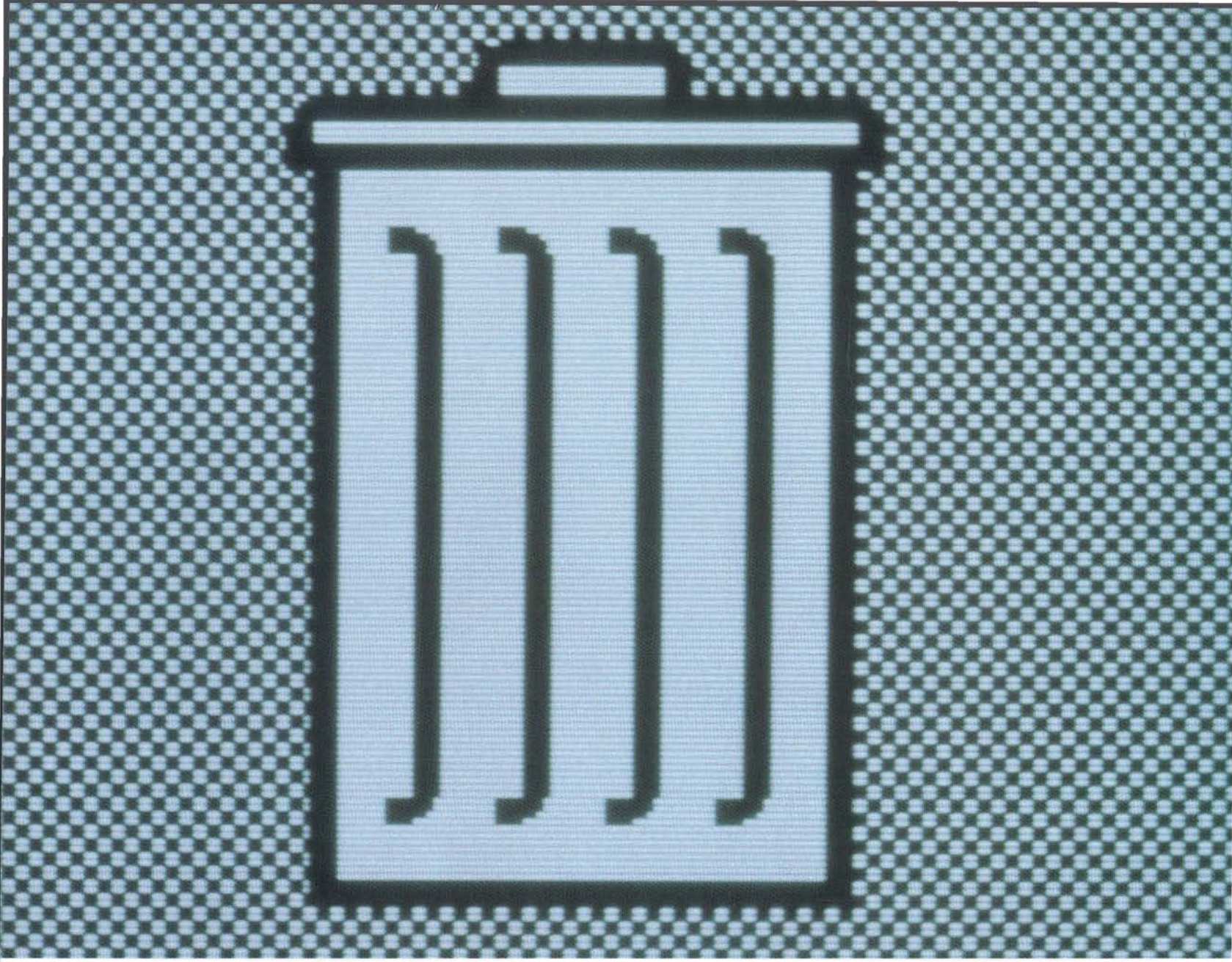
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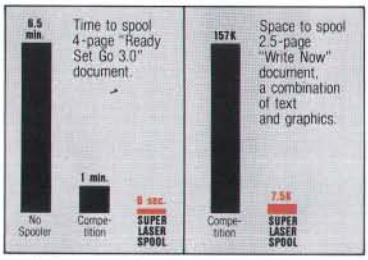
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to be able to assuage the corporate Oedipal trauma.

A Switch in Time

What happened with MultiFinder illustrates the paradox. The program was really born from the limitations of the Finder, the file-handling program in the form of a desktop that was released with the original Mac. On early Macintoshes, closing down one program and opening another was a process that one did not undertake without setting aside some spare time. Competing computers did not have this problem, and it was something that, in certain eyes, damned the Macintosh to the status of a toy or curiosity. But no one really addressed that problem until Andy Hertzfeld, on a suggestion from writer John Markoff, hacked up a program called *Switcher.*

Switcher was originally a two-week project, done in time for the first Hacker's Conference in November 1984. Apple immediately saw the program's value, and Steve Jobs himself bought the program from Andy for $100,000 only minutes after viewing it. For Apple it was money well spent, as *Switcher,* in its various versions, became a terrifically useful, if not particularly robust, program.

By the next summer the Mac market was floundering. As Andy Hertzfeld roamed the sparsely attended aisles of the August 1985 Macworld Expo, he wondered what else he could do to help the Mac. He decided to rewrite the Finder, incorporating the features of *Switcher,* so the computer would be even easier to use and could more easily run several programs at once. So he set about writing a program to be called *Servant.* By the New Year he had it running. Indeed, it had multiple windows: you could open a program and then, by downscaling a window, see the desktop. From there, you could open another program, and another. Andy began to see how you could even do some multitasking—actually using one program (say a word processor) while a second program was performing a task (such as a communications program downloading a file).

Hertsfeld took *Servant* to Apple and showed it to the systems software group. There were gasps and buggy eyes—the previous day the group had set as its top 1986 priority to do a similar program. In no time Andy was negotiating to sell his work to Apple. The price this time was to be around $200,000. But Andy Hertzfeld was troubled. He had no confidence that the

(continues)

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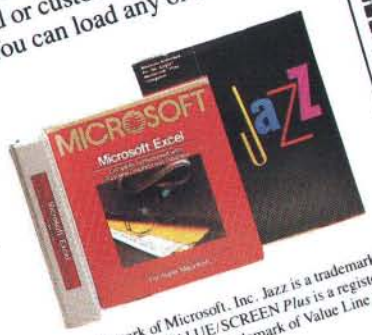
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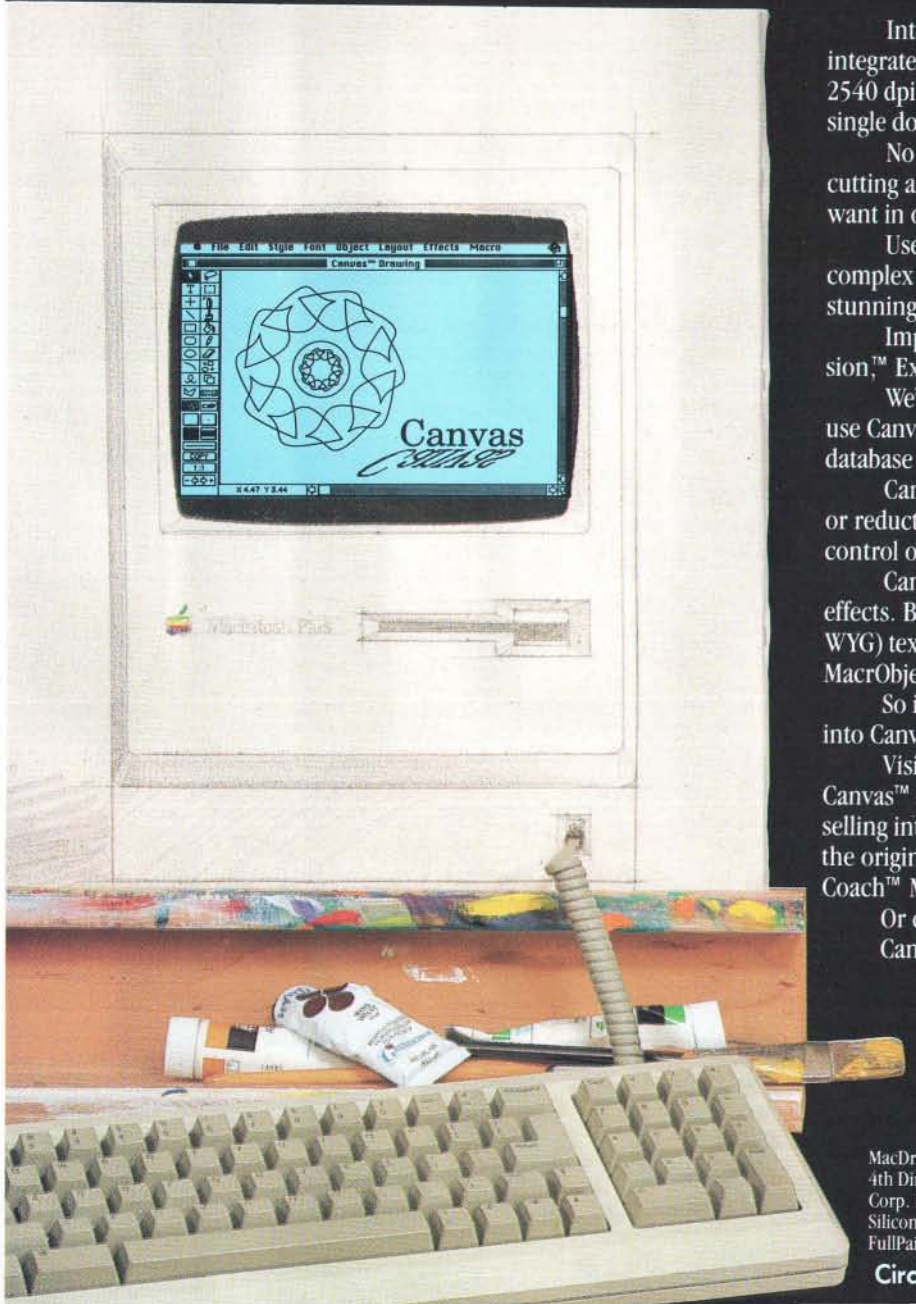
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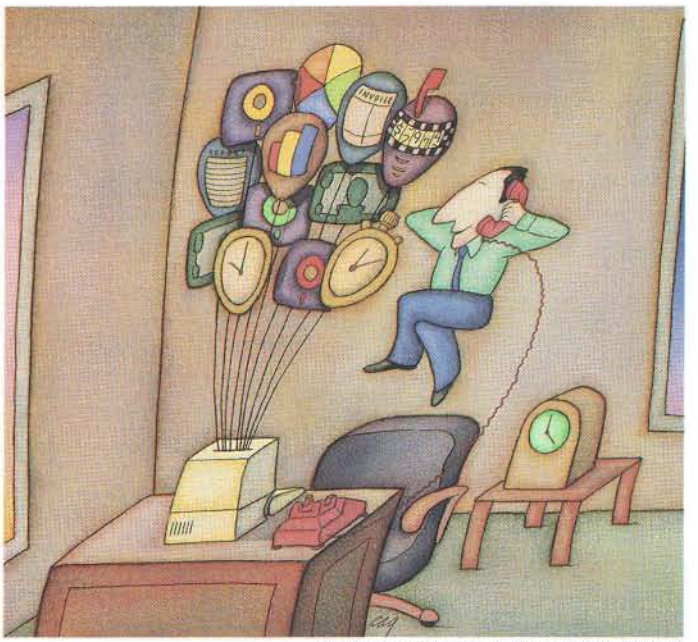
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new Apple would preserve all the neat tricks and user-pleasing ideas of *Servant* in its own finished product. The strength of *Servant* was in its more powerful interface–new ways to show icons, move them around, and arrange them on screen–but Apple wanted to emphasize multitasking in its eventual product. Hertzfeld couldn't sleep at night, torn between preserving the artistic integrity of the product and doing "what would be best for Mac."

He thought he could do a better job of writing the program himself, insulated from the Apple bureacracy. But he knew that no matter how good his program was, it didn't have a chance at effective multitasking unless Apple itself marketed the program as basic system software. Only then, with the mother company supporting the product, would there be incentive for those who write applications software to conform to the inevitable restrictions of this new Finder so that the applications would "behave" together.

Finally Hertzfeld arrived at a solution. He approached Apple and offered them the program for *half* the $200,000–if they would take nonexclusive rights. That way, he would work on his product, and they would work on theirs. Apple accepted, and MultiFinder was underway.

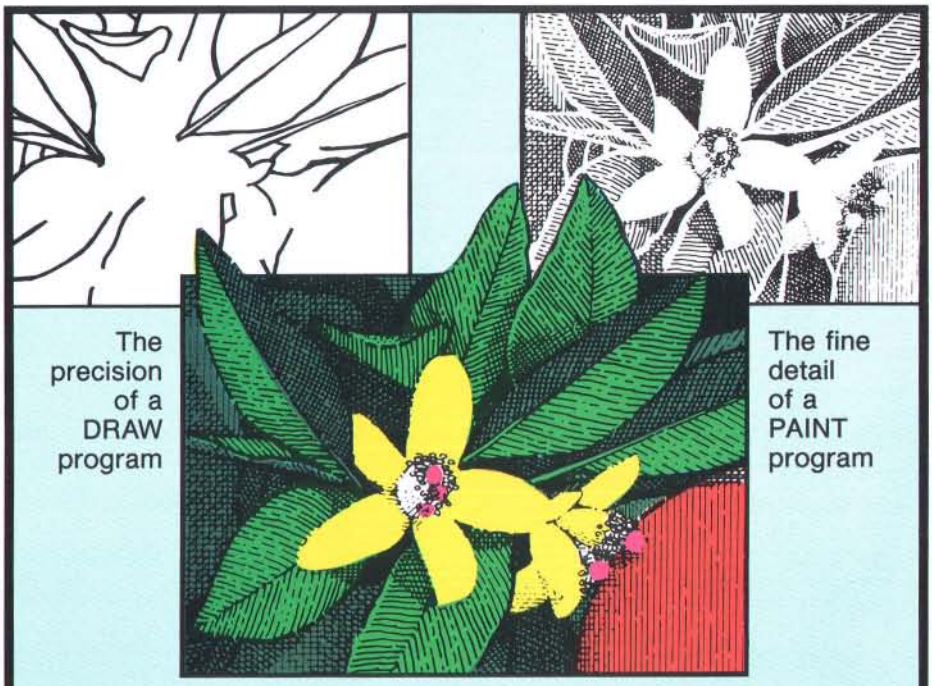
Andy, meanwhile, continued to work on *Servant,* which he intended to distribute free to anyone who cared to have it. The dream would be preserved.

Every Twitch Way

That's Andy's half of the story. Now for Apple's.

By 1986 it was clear to everyone at Apple that the Mac needed a new Finder that could handle more than one program at once. That capability was expected on the new Mac II, and it would be a boon to Apple if the program would work on older Macs as well. Why Apple was not hard at work on this *before* 1986 is a mystery, and maybe a scandal, but in any case it became a priority. The person charged with creating this software was Erich Ringewald, then 26, an Apple engineer since March 1985. It was Ringewald who had been assigned responsibility for *Switcher* support in the latter versions of that program, though his relationship with Andy Hertzfeld had never been warm. Ringewald respected Hertzfeld's talents, but thought he could do the new Finder, code-named Twitcher (clever, huh?), very well, thank you, without Andy's help.

(continues)



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According to Ringewald, Apple's purchase of *Servant* was irrelevant to those working on Twitcher. "We had the same goal, but Andy was beginning from the old Finder and interested in user extensions to it," he says. "I was interested in a stable mechanism [to run more than one program at once]." A big difference between the two programs is how they handle windows when two or more programs run at once. (Just how they differ is too technical get into here, and I suspect it's one of those religious battles that programmers have.) As far as Ringewald was concerned, Apple's purchase was unnecessary, and he insists that he was never even curious to see *Servant*.

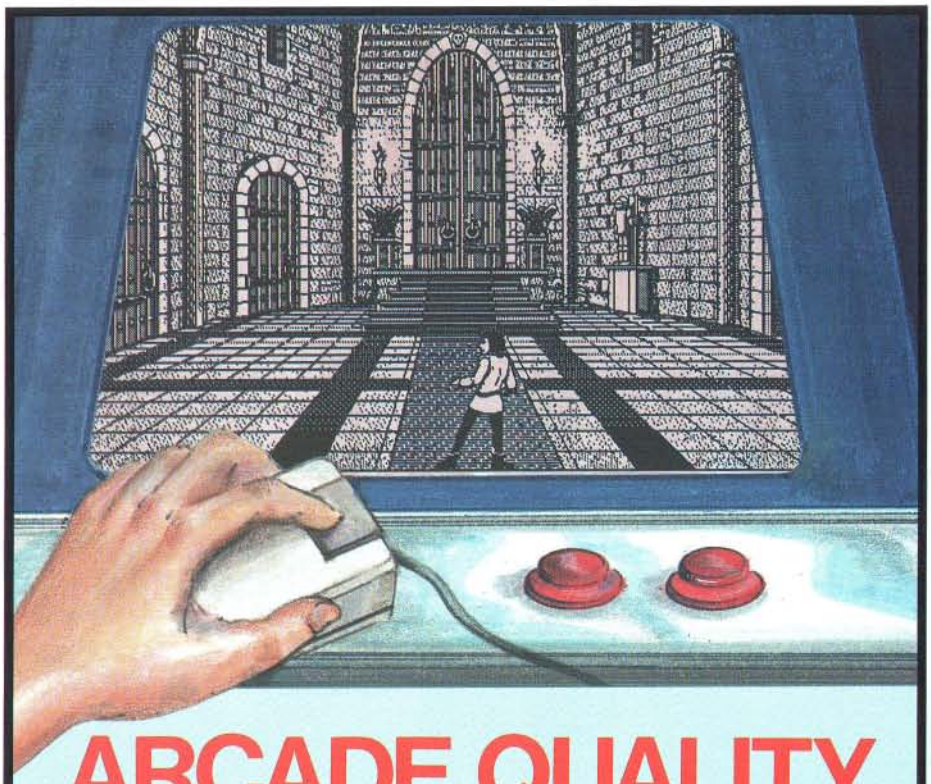
Ringewald was later joined by a new Apple programmer, Phil Goldman, and by the end of 1986 Apple was ready to send a prerelease Twitcher to selected developers, under the name of Juggler. The biggest problem, as expected, was accommodating applications that "misbehaved" in certain ways: some programs try to hog the whole machine. Ringewald thinks he did a pretty good job in dealing with those malefactors, or at least setting up rules for their rehabilitation in future versions. By the time of the Expo, when the program was announced, MultiFinder (alas, the nifty Juggler name was already taken) was able to run an impressive demo without crashing. Judging from the educated oohs and ahhs from that demo, Apple did the right thing with MultiFinder. By concentrating on the juggling power rather than *Servant*-like user-interface features, it gave its customers what they needed immediately.

How soon they would have done this without Andy Hertzfeld's original contribution is a matter of opinion. My opinion: not soon enough.

Memory Lane

So where are we now? Well, MultiFinder is a big step for Apple, which sees it mainly as that–a step. Charles Oppenheimer, Apple's mouthpiece for MultiFinder, explains that system software is "not a point in time, it's a continuum." At this point in the continuum, we have a Finder heir that can kind of do multitasking. That near-hit does not satisfy everybody. In these grown-up days of Macintosh, there is no shortage of techno-weenies and MIS guys who huff and puff and say, "Can this do *true* multitasking?" And to those, Charlie Oppenheimer says, "Not exactly." But he says MultiFinder will increase the

(continues)



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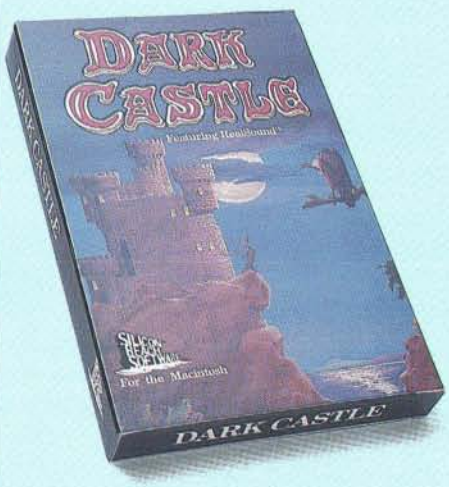
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System Requirements:
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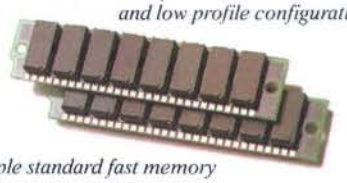
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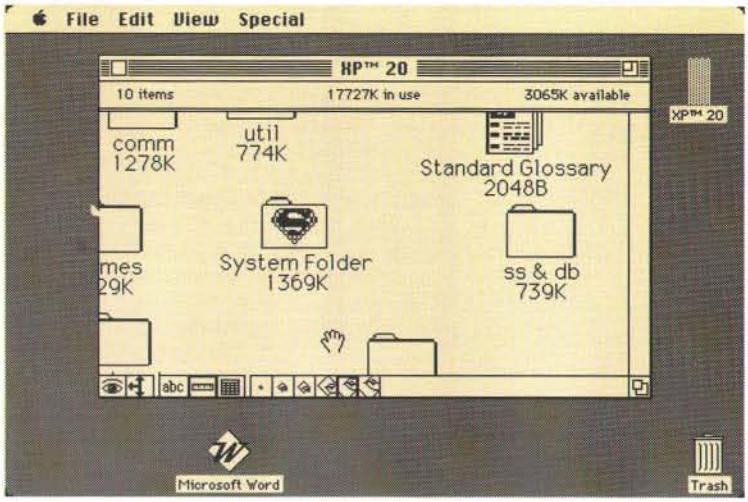
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Steven Levy



Servant *uses the hand to move around, instead of scroll bars. The tools at the bottom of the window let you navigate in the window and customize the user interface. Here, a magnified view is selected and the file-size icon (ruler symbol) is selected, causing the file's K count to appear under each file or folder name.*

utility of the Macintosh because it is now absurdly easy to have several applications open at the same time. This is especially helpful for those running *HyperCard,* a program that works best if it is "on" all the time. And what multitasking MultiFinder does do–background printing for laser printers and communications while other programs run–is the kind of thing most people will use. Best of all, MultiFinder does this on Mac Pluses and SEs as well as the Mac II, something we veterans will appreciate.

Later on will come a version in which programs not only run at the same time, but also run *with* each other. How much later on is anyone's guess.

It's a brave new world, but there is an entry fee. MultiFinder takes up a lot of memory on its own–so much that with "only" a megabyte of memory, the hopper fills up after only one decent-size application, negating the purpose of the program. And *HyperCard,* presumably the program that will take most advantage of MultiFinder, won't run *at all* with MultiFinder in a 1MB machine. Since at this writing no Apple computer comes standard with more than 1MB of memory, we are now in a situation analogous to the days of the 128K Mac, the last time Apple shipped a computer with insufficient power to run its standard software. Now 2MB is the obvious minimum, probably 3MB if you want *HyperCard* on all the time.

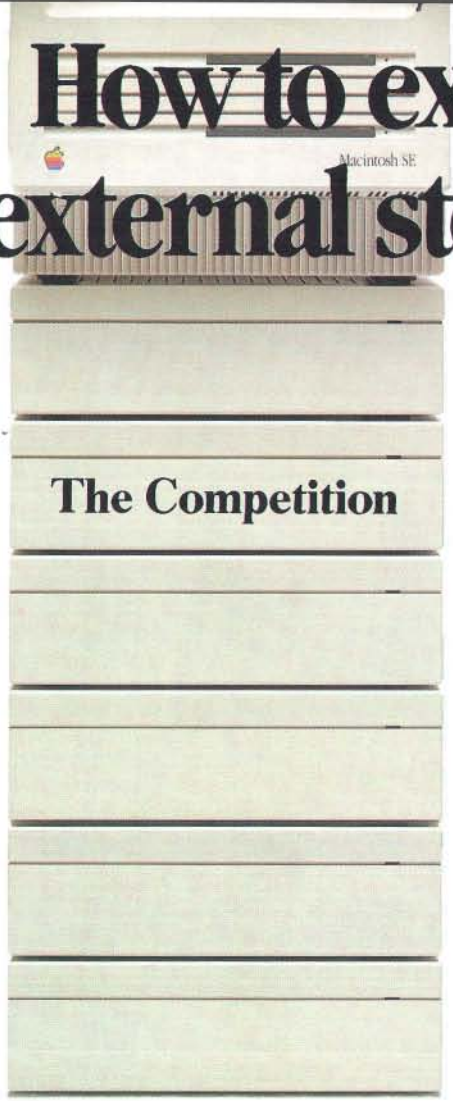
People will eventually get the extra memory, and the New Apple will find MultiFinder a valuable weapon in its battle for real-world acceptance for the Macintosh. The present MultiFinder is a big win, and its future looks even more promising.

For Andy Hertzfeld, though, the experience has been mixed. He's spent months working on his version of the Finder, *Servant,* perhaps imprudently. "I couldn't help it," he says, "I wasn't working on it, it was working on me." *Servant* is now available on CompuServe and other bulletin boards, and from user groups. You should check it out, see the way it handles icons, and marvel at its file-copying tricks. Have fun with it. Andy hopes that its innovations will find their way into Apple's system software: "In a way, I'm forcing Apple to improve things. If I come up with a better way of doing something and people see it, Apple will copy it." Or so he hopes.

Meanwhile, MultiFinder is here, relegating *Servant* to the status of a curiosity. MultiFinder is not so much fun as it is productive. Just like the New Apple. The Macintosh, as evidenced by the gold-diggers at the Expo, has finally made it. Nodding toward the masses of well-heeled professionals making the rounds of over 200 exhibitors at the show, Andy Hertzfeld admitted that it was the end of an era. "The Mac roller coaster has come to a halt," he said, indicating that the days of ups and downs have been replaced by stable acceptance. "It's time for me to get off and find a new one."

For Apple it's time to consolidate and improve, and to make further inroads into the serious world of computing. The MultiFinder and its descendants will do that. But I hope the company won't forget the early creativity that gave Mac its technological head start–nor the people who, with the foolishness of lovers, gave years of their lives, as well as their hearts, to a computer and a dream. Apple will survive without Andy Hertzfeld and indeed without Steve Jobs. But there is no need for Apple to purge its zealous past in order to preserve its productive future. □

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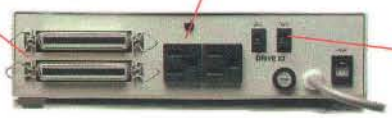


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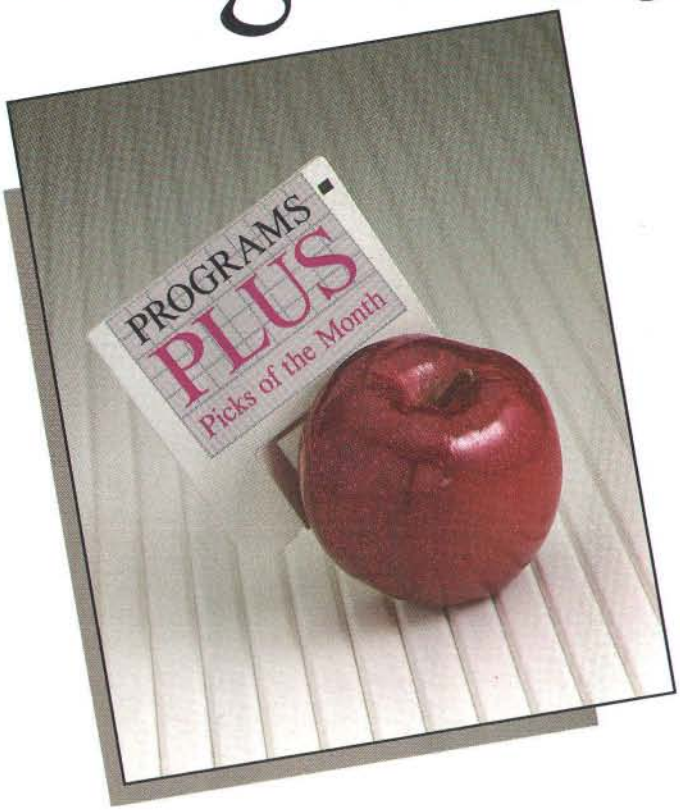
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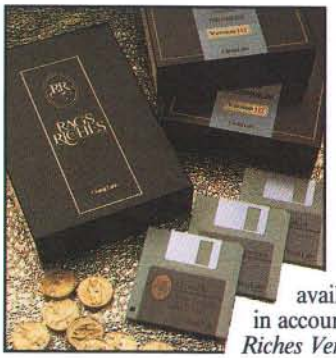
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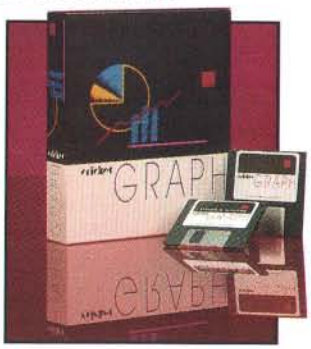
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Sentinel ***Special*** 82.
THINK Technologies
HFS Navigator 35.
LaserSpeed *(Single User)* 55.
Williams & Macias myDiskLabeler 24.
myDiskLabeler w/Color 33.
myDiskLabeler w/LaserWriter Option 35.
Working Software, Inc.
Findswell *(Document Finder)* 32.

Desk Accessory Programs

Affinity Microsystems Tempo 54.
Batteries Included
Battery Pak *(9 Desk Accessories)* 31.
Borland SideKick V2.0 59.
Cortland
Top Desk *(7 New Desk Accessories)* 33.
Greene, Inc. QuickDex *(Computerized Address Book)* 24.
Imagine Software
Smart Alarms & Appointment Diary 35.
Multi-User Appointment Diary with Smart Alarms 95.
Solutions, International
SmartScrap & The Clipper *(New Scrapbook DA)* ***Special*** 38.

Languages

Apple Computer
MacPascal 99.
Borland
Turbo Pascal 59.
Turbo Pascal Database Toolbox 59.
Turbo Pascal Numerical Methods 59.
Turbo Pascal Tutor 49.
Consulair
Macintosh 68000 Development System 59.
Mainstay
V.I.P. *(Visual Interactive Programming)* 85.
Microsoft
Microsoft Basic Interpreter 3.0 62.
Microsoft Basic Compiler 1.0 119.
Microsoft Fortran Compiler 2.2 169.
THINK Technologies
Lightspeed C 95.
Lightspeed Pascal 65.
TML Systems
TML Pascal V2.0 68.
Zedcor, Inc.
ZBasic 4.0 69.

Communications Software

Apple Computer MacTerminal 99.
Compuserve
Compuserve Starter Kit 24.
DataViz MacLink Plus with Cable 149.
Software Ventures
Microphone I.1 *(Includes Glue)* 119.
Think Technologies, Inc.
InBox-Starter Kit V2.0 *(3 Personal Connections)* 199.
InBox-Mac Connection 79.
InBox-PC Connection *(Req. AppleTalk Card)* 109.

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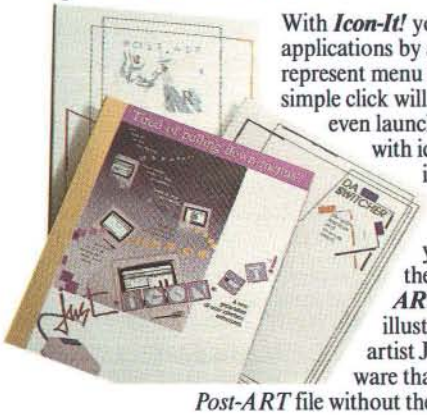
SuperSpool, SuperLaserSpool, DiskFit & Sentinel by SuperMac Software



Sooner or later you'll find that you have to spool-up, back-up or lock-up your data and it's a safe bet that *SuperMac* has just the programs you'll be looking for. ***SuperSpool*** and ***SuperLaserSpool*** return control of your Mac to YOU while your printer is busy printing. ***DiskFit*** is a utility that let's you quickly backup your hard disk to floppies keeping your data protected from electronic tribulations. And, ***Sentinel*** allows you to lock up your private documents by encrypting the data, keeping it safe from prying eyes!

SuperSpool ..... **42.**
SuperLaserSpool ..... **82.**
Multi-User SuperLaserSpool ..... **199.**
DiskFit ..... **42.**
Sentinel ..... **82.**

Icon-It!, DA-Switcher, and Post-Art by Olduvai Software



With ***Icon-It!*** you can add life to all your applications by assigning familiar pictures to represent menu items or desk accessories. A simple click will do the job — and you can even launch Excel or Tempo macros with icon selections. ***DA-Switcher*** is designed to allow you to use an unlimited amount of desk accessories by letting you "switch" the accessories in the Apple menu. And, ***Post-ART*** is a 3-disk set of full-size illustrations by the award-winning artist J. Ciccone which includes software that allows you to print every *Post-ART* file without the need of a drawing program!

Icon-It! ..... **40.**
DA-Switcher ..... **25.**
Post-ART ..... **35.**

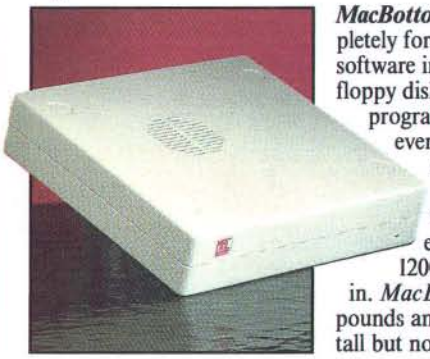
SmartScrap & The Clipper by Solutions International



SmartScrap & The Clipper includes two desk accessories that enhance the way you deal with your clip art. *SmartScrap* is an improved scrapbook DA that allows you to see all your clip art by scrolling and lets you keep multiple scrapbooks on any disk. And, *The Clipper* is a great cropping and scaling tool that determines the dimensions of an area where a picture is to be pasted, reducing or enlarging it to the exact dimensions needed.

SmartScrap & The Clipper ..... **38.**

MacBottom SCSI Hard Disk Drives by PCPC



MacBottom SCSI Drives arrive completely formatted with easy-to-use software including a print spooler, a floppy disk duplicator and a backup program. *MacBottoms* come with everything you need to get started including cables, terminators, and an additional SCSI port. You can even get a Hayes compatible 1200 baud modem built right in. *MacBottoms* weigh less than five pounds and measure just two inches tall but no other hard disk stacks up!

Available in either platinum or beige color. Please specify.

MacBottom 21 MB Hard Drive ..... **759.**
MacBottom 32 MB Hard Drive ..... **889.**
MacBottom 45 MB Hard Drive ..... **1149.**
Optional Built-in 1200 Baud Modem models ..... **Call**

MacKids Educational Programs by Nordic Software



MacKids is a complete series of twelve quality educational software products for the Mac specifically designed to teach and entertain kids. Whether your children are preschoolers or young adults, there's a *MacKids* package that will give them the learning edge.

Preschool Disk 1 (3-7), Preschool Disk 2 (3-7), CoinWorks (4-12), ClockWorks (4-10), Early Elementary 1 (6-9), Lemonade Stand (6-16), FlashWorks (6-adult), Naval Battle (6-adult), Word Search (6-adult), Alphabetizer (7-adult), EarthWorks (10-adult), or Bodyworks (10-adult).

Each Program ..... **29.**

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Disk Drives/Hard Disks/Upgrades

AST Research
AST fAST-20 *(20MB Ext. for MacPlus, SE and Mac II)* 859.
AST-2000 *(20MB Ext. with 20MB Tape for MacPlus & Mac SE)* 1395.
AST-4000 *(74MB Ext. with 60MB Tape for MacPlus & Mac SE)* 3695.
Mac86 Co-Processor *(Mac SE)* 419.
Mac286 Co-Processor *(Mac II)* 1049.
Central Point
Central Point 800K External Drive 185.
Dove Computer Corporation
MacSnap Model 524 *(512K to 1MB Upgrade)* 139.
MacSnap Model 524S *(512K to 1MB Upgrade w/SCSI Port)* 239.
MacSnap Model 548 *(512K to 2MB Upgrade)* 369.
MacSnap Model 548S *(512K to 2MB Upgrade w/SCSI Port)* 429.
MacSnap 2S or 2H *(1MB to 2.5MB Upgrade for MacPlus or Mac SE)* 449.
MacSnap 4S or 4H *(1MB to 4MB Upgrade for MacPlus or Mac SE)* 879.
MacSnap Toolkit *(Wrench, Case Cracker & Grounding Set)* 16.
Ehman Engineering
Ehman 800K External Disk Drive 189.
First Class Peripherals
Sider C-46 *(40MB Hard Drive with 60MB Tape for MacPlus/SE or Mac II)* 1399.
General Computer Corporation
FX/20 *(20MB External Hard Drive for MacPlus)* 649.
FX/40 *(40MB External Hard Drive for MacPlus)* 889.
F1/40 *(40MB Internal Hard Drive for Mac SE)* 889.
HyperCharger 020 Call
MacMemory, Inc.
Turbo SE *(16 Mhz 68000 Accelerator for the Mac SE)* 399.
Motorola 68881 *(Math Coprocessor for Turbo SE)* 349.
MaxPlus Mega *(2MB Upgrade with 1MB Chips for MacPlus)* 345.
Megabyte SIMMS for the MacPlus, Mac SE, Mac II, TurboMax and Turbo SE equipped Mac:
MultiSIMMs 2MB Set *(1MB to 2.5MB Upgrade)* Call
MultiSIMMs 4MB Set *(1MB to 4MB Upgrade)* Call
Personal Computer Peripherals
Beige or Platinum Color. Optional Built-In Modems Available.
MacBottom HD-21 *(20+Mb SCSI Hard Disk)* *Special* 759.
MacBottom HD-32 *(32Mb SCSI Hard Disk)* *Special* 889.
MacBottom HD-45 *(45Mb SCSI Hard Disk)* *Special* 1149.
MacBottom 20 *(20+Mb Serial Hard Disk for Mac 512k & MacPlus)* 855.

Laser Printers & Digitizers

AST Research
TurboLaser/Mac 3039.
TurboScan *(Optically Scans & Digitizes at 300 Dots-Per-Inch)* 1385.
General Computer Corporation
Personal Laser Printer 1879.
Impulse
Impulse *(MacNifty)* Audio Digitizer V2.0 w/SoundCap 149.
Koala Technologies Corp.
MacVision *(Digitizer)* 169.
New Image Technology
Magic Digitizer *(Mac 128/512k or MacPlus Version)* 249.
Summagraphics MacTablet 12x12 size 379.
ThunderWare
ThunderScan V4.0 with Power Port *(Mac 512K, 512K Enhanced, MacPlus, and Macintosh SE)* 199.

Accessories

Bech-Tech
Fanny Mac *(Beige or Platinum)* 69.
Cambridge Automation
Numeric Turbo 99.
Central Products
MacOpener *(All In One Mac Tool)* 16.
Curtis Manufacturing
Diamond-Surge Suppressor-SP-1 29.
Emerald-Surge Suppressor-SP-2 36.
Ruby-Surge Suppressor-SPF-2 55.
Sapphire-Surge Suppressor-SPF-1 47.
Ergotron
MacTilt or MacTilt SE *(Platinum Color)* 69.
Mouse Cleaner 360° 15.
I/O Design
Mac Luggage Available in Navy or Platinum Gray
Macinware Plus Carrying Case 64.
Macinware SE Carrying Case 74.
Imageware II Carrying Case 44.
Kalmar Designs
Teakwood Roll-Top Disk Cases:
Micro Cabinet *(holds 45 disks)* 14.
Double Micro Cabinet *(holds 60 disks)* 20.
Triple Micro Cabinet *(holds 135 disks)* 28.
Kensington
External Disk Drive Cover 8.
Mouse Pocket *(Reg. or ADB)* 8.
Mouseway *(Mousepad)* 8.
ImageWriter or ImageWriter II Cover 9.
Macintosh (Plus) Dust Cover 9.
Mouse Cleaning Kit w/Pocket 17.
Disk Drive Cleaning Kit 20.
Tilt/Swivel 22.
Universal Copy Stand 23.
Apple Security Kit 34.
Polarizing Filter 33.
Printer Muffler 80 38.
Printer Muffler 132 51.
Control Center 63.
System Saver Mac *(Beige or Platinum)* 64.
A/B Box *(MacPlus Only)* 63.
Turbo Mouse *(Reg. or ADB)* 82.
Mouse Systems
A+ Mouse *(MacPlus)* 69.
A+ ADB Mouse *(Mac SE/Mac II)* 89.
Moustrak
MousePad 7"x9" Size 8.
MousePad 9"x11" Size 9.
Nutmeg Systems
Nutmeg 15" Monitor *(Displays One Full Page)* 1379.
Nutmeg 19" Monitor *(Displays Two Full Pages)* 1529.
Orange Micro
Grappler C/Mac/GS *(Parallel Interface for the Mac)* 65.
Nuvotech
EasyNet *(Specify Din 8 or DB-9)* 28.
Ribbons Unlimited
Available in Black, Blue, Brown, Green, Orange, Purple, Red, Yellow, Silver & Gold
ImageWriter Ribbon-Black 4.50
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ImageWriter Rainbow Pack *(6 Colors)* 25.
ImageWriter II-Four Color Ribbon 12.
SoftStyle
MacEnhancer 175.
The Madson Line
Professional Series Carry Cases In Black Ballistic Nylon
Mac(Plus) Carry Case 79.
Mac SE Carry Case 99.
ImageWriter I (II) Carry Case 75.

Blank Media

Single Sided 3½" Diskettes
BASF 3½" SS/DD Disks *(box of 5)* 8.
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Sony 3½" SS/DD Disks *(box of 10)* 14.
Centech 3½" SS/DD Color Disks *(box of 10)* 16.
Fuji 3½" SS/DD Disks *(box of 10)* 14.
Maxell 3½" SS/DD Disks *(box of 10)* 13.
Verbatim 3½" SS/DD Disks *(box of 10)* 13.
3M 3½" SS/DD Disks *(box of 10)* 14.
C.Itoh Color Disks SS/DD *(box of 10)* 22.

Double Sided 3½" Diskettes
BASF 3½" DS/DD Disks *(box of 5)* 9.
Bulk *(Sony)* 3½" DS/DD *(10)* 16.
Centech 3½" DS/DD Color Disks *(box of 10)* 19.
Sony 3½" DS/DD Disks *(box of 10)* 18.
Fuji 3½" DS/DD Disks *(box of 10)* 19.
Maxell 3½" DS/DD Disks *(box of 10)* 20.
Verbatim 3½" DS/DD Disks *(box of 10)* 20.
3M 3½" DS/DD Disks *(box of 10)* 20.
C.Itoh Color Disks DS/DD *(box of 10)* 25.

Modems

Hayes Microcomputing
Smartmodem 1200 299.
Smartmodem 1200 Mac w/Smartcom II & Cable 359.
Smartmodem 2400 449.
Transet 1000-128K 269.
Transet 1000-512K 359.
Transet 1000 Mac Accessory Kit 29.
InterBridge *(Connect Appletalk Networks)* 599.
Migent
Migent Pocket Modem *(ext. 300/1200 Baud)* 169.
Prometheus
Promodem 1200 *(Hayes Compatible)* 239.
Promodem 2400 *(Hayes Compatible)* 309.
Mac Pack w/Procom M and Cable *(Specify Mac or MacPlus)* 49.
U.S. Robotics
Courier 1200 *(Hayes Compatible)* 199.
Courier 2400 *(Hayes Compatible)* 349.
Courier 2400E *(Hayes Compatible)* 409.
Courier HST 9600 *(Hayes Compatible)* 689.

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Apple Computer HyperCard 42.
Ashton Tate dBase Mac 1.0 295.
Blythe Software
Omnis 3 Plus/*Express* 279.
Omnis 3 Plus Multi-User *(MacServe, Tops Network, Corvus, or Appleshare Network)* 489.
Borland Reflex Plus 165.
Chang Laboratories
C.A.T. Contacts•Activities•Time 229.
Microsoft Microsoft File 1.05 110.
Nantucket Software McMax 189.
Nashoba Systems FileMaker Plus 149.
Odesta Double Helix II 339.
Multi-User Helix 429.
ProVUE Development OverVUE 2.1 149.
Software Discoveries RecordHolderPlus 45.

Business Software

Activision Focal Point 64.
Apple Computer MacProject 159.
Bravo Technologies MacCalc 85.
Borland Eureka! The Solver 129.
Cricket Software Cricket Presents... 289.
Cricket Graph *Special* 119.
Data Tailor
Trapeze 2.0 *(Spreadsheet/Color Report Generator)* 239.
Deneba Software Comment *(Attach Electronic Notes to Files)* 64.
Layered
Notes For Excel, Jazz, PageMaker, Microsoft Works or Word 3.0 *(each)* 41.
Legisoft/Nolo Press WillWriter V2.0 30.
Lotus Jazz 1A 179.
Lundeen & Associates
WorksPlus Commands 65.
MacroPac International
101 Macros For Excel 45.
Micro Planning Software
Micro Planner Plus 299.
Microsoft Microsoft Works 1.10 185.
Microsoft Multiplan 1.11 110.
Microsoft Chart 1.02 72.
Microsoft Excel 1.04 224.
Microsoft PowerPoint Call
Satori Software Legal Billing 369.
Legal Billing II 539.
Project Billing 439.
Bulk Mailer 3.0 82.
Bulk Mailer Plus 3.0 195.

Word & Outline Processors

Ann Arbor Softworks
FullWrite Professional 169.
Apple Computer MacWrite 99.
Firebird Licensees
Laser Author 125.
Living Videotext More 149.
Microsoft Microsoft Word 3.01 239.
MindWork Software
MindWrite 1.1 159.
OWL International
Guide 77.
Guide Envelope System 99.
Symmetry Acta V2.0 37.
T/Maker Company WriteNow 98.

Spelling & Grammar Checkers

Aegis Development
Doug Clapp's Word Tools 42.
A.L.P. Systems MacProof 3.0 *(Requires MacPlus)* 125.
Batteries Included
Thunder! *(Interactive Spelling Checker)* 31.
Deneba Software
Spelling Coach 3.0 *(Webster's/Medical/Legal/Hyphenation)* 62.
Spelling Coach 3.0 Professional *(Adds Definitions & Thesaurus)* 119.
Coach Merriam Webster's Thesaurus 2.0 39.
Lundeen & Associates
WorksPlus Spell 1.1 49.
Microlytics, Inc.
Word Finder *(Synonym Finder)* *Special* 39.
Working Software, Inc.
Spellswell Spelling Checker & Proofreader 2.0 42.
Spellswell Medical Dictionary *(35,000 Medical Terms)* 57.
Lookup *(Makes Spelling Suggestions)* 29.

Desktop Publishing

Aldus Corporation
PageMaker 399.
Allan Bonadio Associates
Expressionist *(Equation Processor)* 52.
Boston Publishing Systems
The MacPublisher III 119.
Letraset Ready, Set, Go! 4.0 279.
ImageStudio *(Image Processing Software)* 279.
Postcraft International, Inc.
Laser FX *(Special Effects for Desktop Publishing)* 125.
Quark, Inc. QuarkXPress 479.
Solutions, International
Glue *(Adds "Print to Disk" Capability)* 38.
Super Glue *(Graphics Integration Software)* 57.
Target Software Scoop 379.

Accounting Packages

Chang Labs
New Enhanced Version III Modules!
Rags to Riches GL, AR, or AP 120.
Rags to Riches Three Pack-*(GL/AR/AP)* *Special* 279.
Inventory Control or Professional Billing 239.
Professional Three Pack-GL/Professional Billing/Payables 349.
Digital, Etc.
Turbo Maccountant V2.0 255.
Migent In House Accountant 99.
Monogram Dollars & $ense 4.0 81.
Peachtree
Back To Basics Three Pack *(GL/AR/AP)* 139.
Survivor Software MacMoney *(Financial Planner)* 41.

Statistics Packages

BrainPower
StatView 512 Plus 175.
Cricket Software Statworks 75.
Systat
Systat 3.1 *(Specify Mac 512K, MacPlus, or Mac II)* 459.

Graphics Software

ABA Software Draw It Again Sam... 99.
Adobe Systems Adobe Illustrator *(MacPlus, SE & Mac II)* 379.
Altsys Corp. FONTastic 27.
FONTastic *Plus* 48.
Fontographer 2.2 239.
Ann Arbor Softworks Full Paint 53.
Apple Computer MacPaint 99.
Broderbund Print Shop 38.
VideoWorks II 119.
Casadyware
Fluent Fonts 2.0 *(Two-Disk Set)* 28.
Fluent Laser Fonts Vol. 1-15 *(ea)* 46.
Deneba Software Canvas 1.0 *(Includes Desk Accessory)* 125.
Dubl-Click Software
World Class Fonts! *(Both Volumes)* 46.
WetPaint *(Both Volumes)* 46.
Enzan-Hoshigumi USA
MacCalligraphy 2.0 115.
Japanese Clip Art Scroll 1 *"Heaven"* or Scroll 2 *"Earth"* 59.
Japanese Clip Art *"Borders"* Scroll 69.
Foundation Publishing
Comic Strip Factory 48.
Comic People 26.
LaserWare, Inc. LaserPaint 315.
LaserWorks 195.
Miles Computing
Mac The Ripper, Orchestra of Fonts, People-Places-Things, or Taking Care of Business *(each)* 27.
Mindscape ComicWorks 47.
GraphicWorks 1.1 87.
Olduvai Software
Post-ART *(Three Disk Set)* *Special* 35.
Silicon Beach Software
SuperPaint 79.
Silicon Press 41.
Solutions International
The Curator *(Catalog Your Art)* 89.
Springboard Certificate Maker 35.
Symmetry PictureBase 59.
T/Maker
Click Art Letters I, Letters II, Personal Graphics, Publications, Effects, Business Image, or Holidays *(each)* 28.
Christian Images 38.
Click Art Laser Fonts: Plymouth, Bombay, or Seville *(each)* 45.

CAD Products

Apple Computer MacDraw 159.
Challenger Software
Mac 3D *(Enhanced Version 2.0)* 119.
Cricket Software Cricket Draw 175.
Enabling Technologies Easy 3D 79.
Professional 3D 199.
Innovative Data Design
MacDraft 1.2A 155.
Silicon Beach Software Super 3D 159.
Super 3D Enhanced *(Mac II)* 249.

Educational/Creative Software

Baron's Baron's SAT 35.
Bogas Productions Studio Session 52.
Broderbund Sensei Geometry 63.
Calculus or Physics 63.
Davidson & Associates Speed Reader II 39.
Math Blaster or Word Attack! 28.
Electronic Arts
Deluxe Music Construction Set V2.0 62.
1st Byte/Electronic Arts
Kid Talk, Speller Bee, First Shapes, or Math Talk 32.
Mathtalk Fractions, First Letters & Words, or Smoothtalker 32.
Great Wave Software
KidsTime, TimeMasters or NumberMaze 27.
Concertware+ 4.0 39.
Concertware+ MIDI 4.0 79.
Hayden MusicWorks 29.
Score Improvement System for the SAT 58.
Micro: Maps MacAtlas Paint Version *(MacPaint Format)* 32.
MacAtlas Professional *(PICT/MacDraw Version)* 129.
Mindscape Perfect Score SAT w/The Perfect College 46.
Nordic Software
MacKids Educational Programs *(each)* *Special* 29.
Rubicon Publishing
Dinner at Eight-Silver Palate Bundle 51.
Simon & Schuster Typing Tutor IV 35.
Speed Reading Tutor IV 32.
Springboard
Early Games for Young Children or Easy as ABC 28.

Game Software

Accolade Hard Ball 24.
Activision Shanghai or Hacker II 24.
Hacker 16.
Portal 32.
Artworx Bridge 5.0 22.
Avalon Hill Mac Pro Football 29.
Broderbund Ancient Art of War 27.
Bullseye Software
Fokker TriPlane Flight Simulator 33.
Ferrari Grand Prix 33.
Electronic Arts Starfleet I 37.
Venture's Business Simulator 49.
ChessMaster 2000 or Patton vs Rommel 29.
Archon, One-On-One, Pinball Construction Set, Seven Cities of Gold, Software Golden Oldies or SkyFox *(each)* 15.
EPYX Winter Games or Sub Battle Simulator 24.
Hayden Software Sargon III 29.
Infinity Software, LTD.
Grand Slam Tennis 27.
World Cup Soccer 27.
Go 22.
Infocom
Ballyhoo, Bureaucracy, Hollywood Hyjinx, Leather Goddesses of Phobos, Moon Mist, Nord & Bert, Plundered Hearts, Stationfall, The Lurking Horror, Trinity, or Zork I *(each)* 24.
Beyond Zork 32.
Hitchhiker's Guide to The Galaxy 18.
Zork Trilogy 44.
Microsoft Flight Simulator 1.0 32.
Miles Computing Inc.
The Fool's Errand or Downhill Racer 27.
Mindscape
Balance of Power or Crossword Magic 32.
Deja Vu: A Nightmare Comes True 32.
King Of Chicago or Shadowgate 32.
The Uninvited or Siboot 32.
Practical Computer Applications
MacGolf 2.0 or MacRacquetball 36.
MacCourses 34.
Psion
Psion Chess *(3D & Multi-Lingual)* 31.
Sierra On-Line Space Quest 30.
King's Quest I, II, or III *(each)* 30.
Silicon Beach Software
Apache Strike or Beyond Dark Castle 27.
Enchanted Scepters 21.
Dark Castle 27.
World Builder 41.
Simon & Schuster
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Sir-Tech Mac Wizardry 35.
Sphere, Inc.
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XOR Software NFL Challenge 65.

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Verbatim

An interview with Heidi Roizen, president of T/Maker



Heidi Roizen is the president of T/Maker, a Mountain View, California, publisher of software for both the Macintosh and the IBM PC. She began her career with computers as the editor of Tandem Computer's company newsletter while a graduate student at the Stanford School of Business. After completing her MBA, she became the head of T/Maker, a start-up founded by her brother to publish a visual spreadsheet program (a table maker–hence the company name). For the past five years Roizen has directed T/Maker's release of products for word processing, desktop publishing, clip art, graphics, fonts, and spreadsheets.

Currently T/Maker publishes 13 products for the Mac, including a dozen titles in the Click Art *series of fonts and clip art. Last year the company negotiated a major coup: acquiring the right to market* WriteNow for Macintosh, *the word processor Steve Jobs anointed as* MacWrite*'s successor. Sure enough,* WriteNow *has usurped the number-two word processor spot from Apple's now-aging original.*

Your company no longer markets the program that was its namesake, so what does T/Maker do today?

We are the conduit between talented developers and the consumers. Those two communities don't talk to one another, don't understand each other's terms. Our staff epitomizes power users, so we see good products from a user's perspective. Our job is to put the resources behind the developer's ideas to see that they happen.

We catch a product before all of its features are defined, when the kernel is there. We feel our input about features and the user interface is critical to the success of the product. Developers joke that they walk into T/Maker with a product 80 percent finished and leave with a contract and a 20 percent finished product.

Most companies in the software publishing market have a Betty Crocker plan for the business: get investment money, develop a product, promote awareness of the product, buy market share, and get acquired or go public. Then retire to Portola Valley. In other words, most companies in this market think in terms of fast revenue growth, not profits.

We're different. Our goal has always been to be in business for the long haul. Our goal is profitability, and we seek opportunities for profitable growth. Yet in spite of our relative inattention to the top line–gross revenue–we've twice been on the *Inc.* list of the 500 privately held companies with the fastest growing revenues. I guess that means our strategy works.

The entire Mac software industry is now in the process of restructuring–witness the series of small companies that have merged with larger, more established corporations. How do you plan to direct T/Maker?

We have lots of strategic relationships with other companies: NeXT, Borland, Software Publishing Corporation. We also have a lot of name recognition in the market–for the company name, for *Click Art,* and for *WriteNow.* We've been in the market four years with Mac products. To establish that market awareness now would cost a great deal of money.

There are other developers today creating competitive products, but we can still sell more because of the distribution channels. Distributors know that we exist, that we stand behind our products and will be here tomorrow. That takes time to achieve. So we'll continue to use our name, expertise, and organization to bring new Mac products to market.

Like what?

We're still concentrating on *WriteNow,* maintaining it as a standard product for the Mac. There are promising areas of desktop publishing–for example, fonts and accessories–particularly products that are resolution-independent. In other words, desktop publishing products that can work across all personal computer systems. We'll continue to publish innovative products.

What exciting product areas do you see in the market?

First, the area that takes advantage of increased printing resolution–the adoption of the Encapsulated PostScript Format (EPSF) standard and beyond. Second, the new approach to integrated software. In

(continues)

PHOTOGRAPHS BY WILL MOSGROVE

To the thousands of Macintosh™ users who find themselves wishing there was a personal printer that lived up to their personal computer.

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THE PROOF IS IN THE PRINTING.

As you can see, a case could easily be made for buying the PLP on economics alone. But that would be selling it short.

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And a draft mode that lets you rapidly print out works-in-progress for editing and revision by others.

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I expect better, more-intelligent integration of desktop publishing and databases for things like printing phone books or catalogs.

the past we put together spreadsheets, word processors, and database managers. Today there are new integrated categories: we may start seeing programs that can take a blank form received in the mail, scan it in, and then fill it out by recognizing the fields and retrieving the information. Or take a filled-in form and scan it with all its data right into the database. I expect better, more-intelligent integration of desktop publishing and databases for things like printing phone books or catalogs.

Have you noted any changes in the Mac community?

Yes. The coat-and-tie ratio. That is, the number of people that come to the Macworld Expo in a coat and tie. In the old days you knew everybody personally. Now there are big corporations, and people in coats and ties. There's still a glimmer, though, still some Macintosh personality. At PC Expo there's zero.

Do you see parallels between the 1982/83 IBM PC boom and what is going on now with the Mac?

Yes and no. Reaching the $1000 price for an IBM PC clone set off the PC boom. The Mac boom is due to functionality. The Mac passes a threshold of performance in certain applications.

There are some similar areas. Personal computers have begun to enhance basic things that we all do every day. They're becoming things that we have to have in an office or a business, like a photocopier or a cash register.

How do you view the conflict between *Microsoft Windows* and the Macintosh operating system?

As a software publisher, we recognize that both systems are viable. The user's choice between them is going to depend on things such as installed base in the user's company, or the system's price, or the user's desire to use a particular piece of software. Remember that there are ten times as many PCs as there are Macs. Frankly, I use a PC more than a Mac because I started with it, and I'm more fluent with the PC. It's like speaking a language. I have years invested in it, and the change-over would be too costly. If the PC is perfect for my application, why should I switch?

How do you characterize the two operating environments: the Mac and the PC?

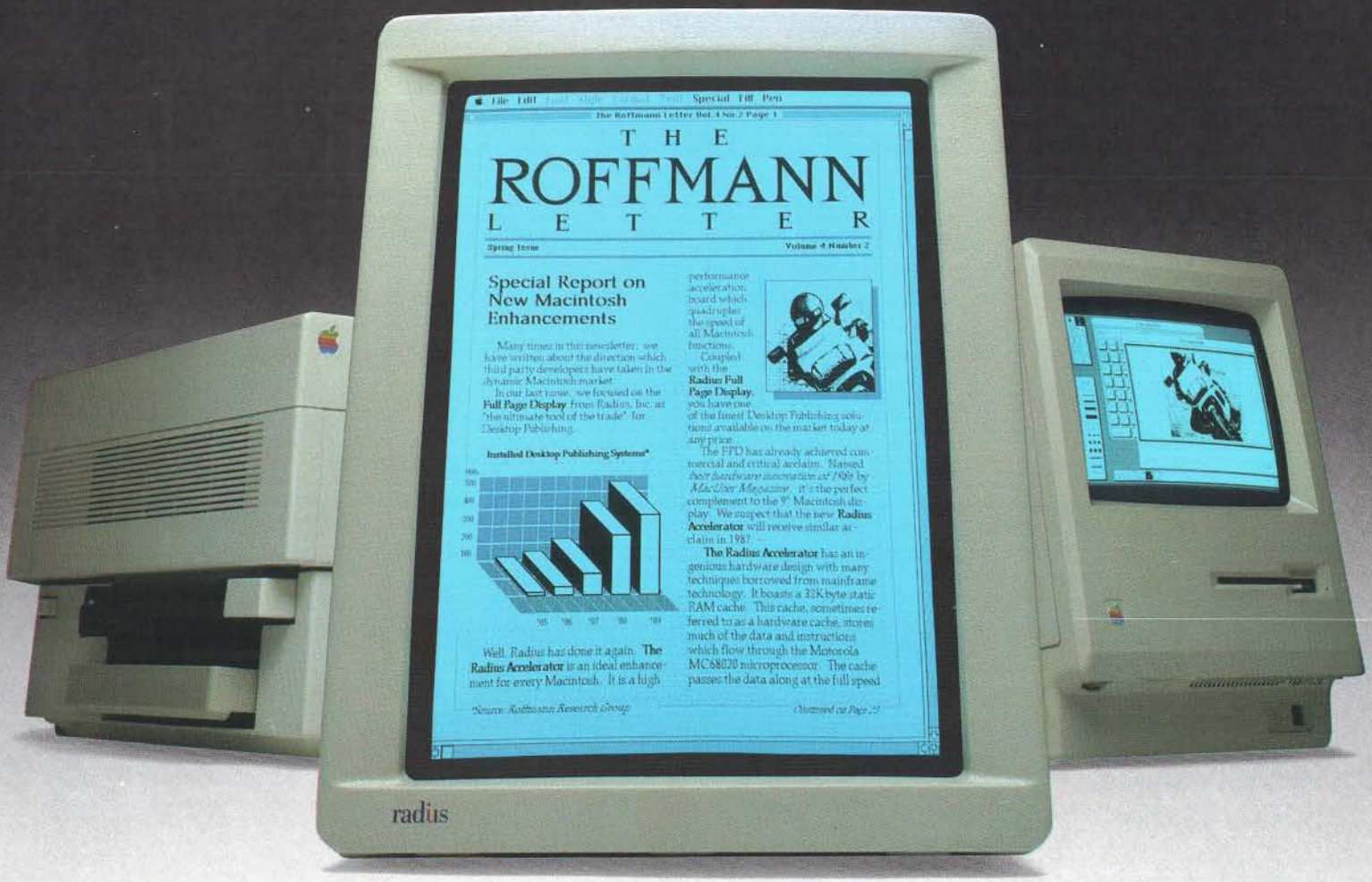
Windows is becoming faster, closer to the Mac. The problem with *Windows* is the

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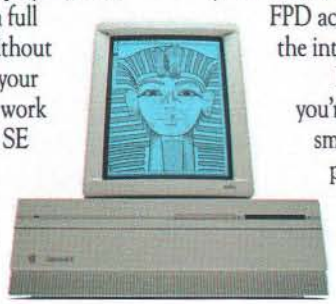
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If PCs are so much cheaper, the Mac will miss out on a large share of the entry-level market.

retrofit issue. When Apple comes out with a new Mac you can retrofit the old Macs with new system software and boards: there is an upgrade path. The Mac also has the advantages of its graphics interface and ease of learning.

IBM has no control over its market, so continuity of systems and software is a big issue. IBM looks at a market as a large automobile manufacturer does–when a machine is out of date you don't upgrade it, you throw it out or relegate it to the home.

Also, the 8088 CPU on the PC is a problem, especially for graphics. Microsoft has said that it will come out with products for high-end users–on the 80286 and the 80386. Even if *Windows* runs only on the more powerful machines, Microsoft expects it to provide a competitive alternative to the Mac because consumers will lean toward a PC that's a successor to what they already own.

Will you still develop for the PC?

Yes. About two years ago the Mac market took a dive. We were safe because we also had general PC products. So the Mac is wonderful, but the PC has a place in the market, too. You can go out and buy one for $600.

Does the Mac cost too much money?

Yes. There is no low-end Mac. The Mac is best with the first-time user–I have no hesitation in recommending a Mac for people just entering computing–but those first-time users don't want to spend $1500 when they can go down to the local Radio Shack and buy a PC clone for $600.

Until there's a Mac available for under $1000 we won't see it sold as an impulse buy, or as the child's first computer for school. The truth is that *any* personal computer provides more productivity than an unaided person had before. For a new computer user then, the relative difference in productivity between the Mac and the PC is small, unless it's in a special area such as DTP on the Mac. If PCs are so much cheaper, the Mac will miss out on a large share of the entry-level market.

At T/Maker, we work with both machines, but everyone in the company except me uses the Mac more than the PC. Few firms can afford to provide employees with two computers.

What do you think about Apple's future?

There is a problem with a company that big. You can't judge its tomorrow by the

(continues)

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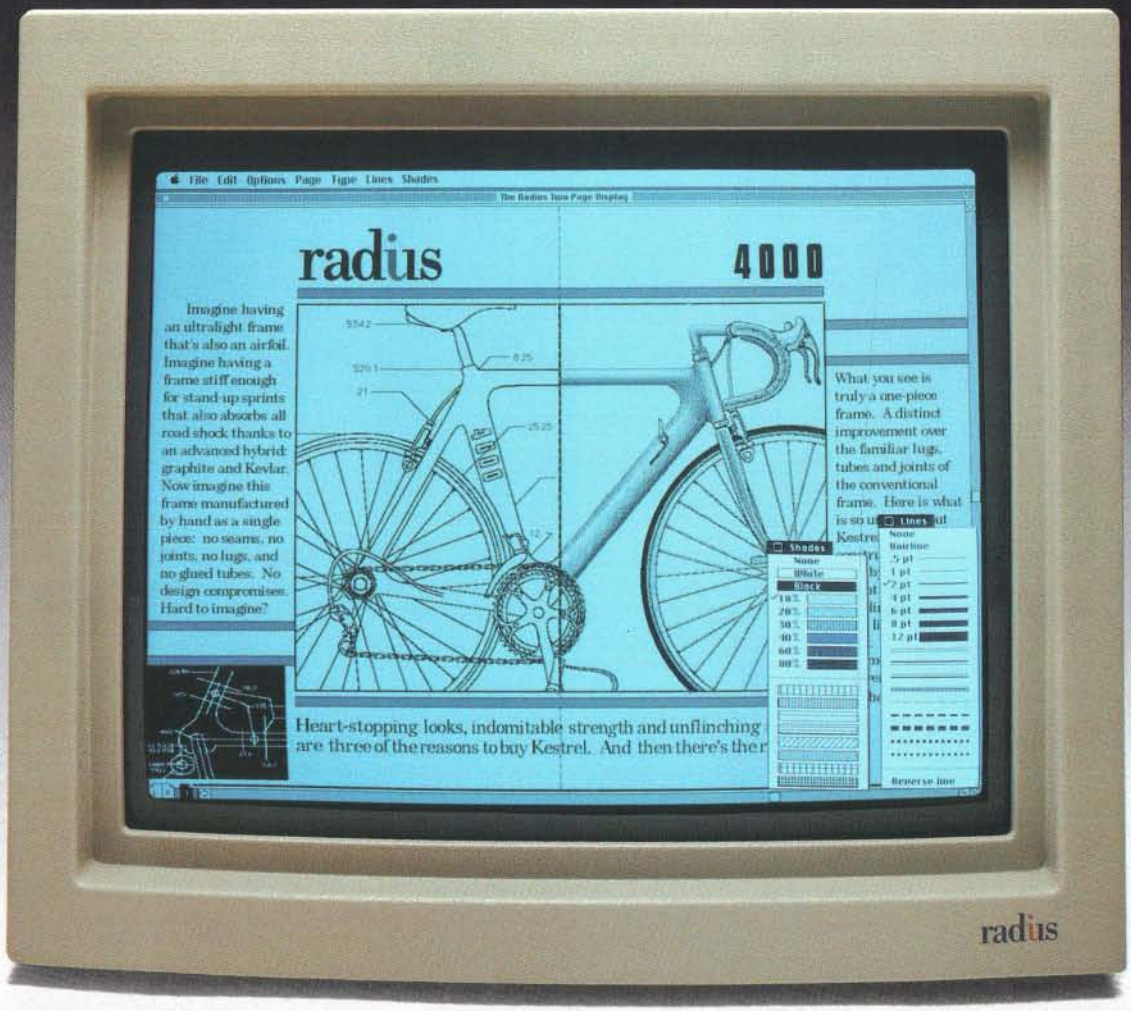
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Fonts are a tough market.... Type is not intuitive to the general computer user.

products it produces today. Especially when there have been so many senior-management changes in the company. I'm certain there is no longer the same sense of spirit at the company there once was; it has lost personality. At the tenth anniversary party one of the primary topics of discussion was the stock price, not the technology or the people. I wouldn't want my company's future tied to Apple, or to any one company, for that matter.

You work with both NeXT (Steve Jobs's company) and Apple, despite a certain animosity between the two. How do you manage that successfully?

We haven't completely avoided all problems. I'm sort of a Hong Kong between China and Taiwan. Each side has value to the other, but they're not speaking. Politically we serve as a conduit–Steve couldn't have published *WriteNow* himself. What would he do–go to Macworld Expo and do demos in Apple's booth? I don't even know if Steve drives through Cupertino these days.

I remember once talking to an Apple product manager who said that he hated seeing royalties on a great Mac product like *WriteNow* going into Steve Jobs's pocket. There is no way to answer comments like that.

Nevertheless, a lot of respect remains between the two companies. The people who wrote *WriteNow* are at NeXT, yet they identify with the Mac and are proud of what they did for an Apple computer.

At first some people at Apple were afraid I would take their prototype equipment and deliver it to Steve, but those suspicions have passed. They recognized that we have nondisclosures on both sides, and a lot of integrity about that. And Steve Jobs is not really interested in what the next Apple machine will be. If he did want technical information, I'm sure he has better sources for technical detail than T/Maker.

What is the impact of Apple's bundling *HyperCard* with the Mac?

The impact depends upon what a company publishes. Apple used to bundle *MacWrite* and *MacPaint*. That was great for T/Maker, because then all owners of the Mac could use our *Click Art*. But there wasn't any market for third-party word processors or paint programs.

It's not a question of whether Apple should provide software, but rather what kind–enhancements to the system or true applications. The system improvements enhance consumers' ability to use the machine, but application development stunts third-party development.

Will a third-party industry develop to provide *HyperCard* stacks? Or will stacks be akin to shareware or desk accessories?

If there is a market for clip art, there is a market for stacks.

Low-volume or accessory software is something someone can always make money from. Maybe not Lotus, because of the investment it has to make in a product, but smaller companies may have profitable applications.

T/Maker was one of the first companies to offer fonts for the Macintosh. What direction do you see for fonts?

Fonts are a tough market. The user is not as interested in buying a specific kind of typeface as we imagine. Type is not intuitive to the general computer user. The average person working with type uses whatever is available; most don't understand the value of different fonts, when to use them, when to mix them, and so on.

We sell both bit-mapped fonts and laser fonts. Today most font sales are for laser fonts. We still sell a lot of bit-mapped fonts to people with ImageWriters who want to make flyers or invitations. But Adobe has a lock on the high-end font market today; it has some proprietary algorithms, which allow it to make the best laser fonts.

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The more fonts people use, the more troublesome it is to design OCR software that reliably recognizes the letterforms.

What about OCR (optical character recognition) software?

Well, the more fonts people use in documents, the more troublesome it is to design software that reliably recognizes the letter forms. Right now it's becoming easier to share information electronically, so I actually see less call for OCR. You just modem a file to someone or send a disk, rather than worrying about whether your company's particular OCR system will read particular fonts.

Your company was also one of the first to produce clip art. What's going on there?

People want more selection at higher resolution. We thought that when scanners became more prevalent, clip art would falter. But having scanners doesn't change a user's ability to input or create quality original art. Scanners are also still expensive. They're quite slow, and it's difficult to make them do what you want.

Our latest clip art is all done with *Adobe Illustrator*. We even chose the same artists Adobe used for its documentation illustration so that our art would be of the highest quality. The laser printer output from this *Illustrator* art is much better than the stuff done with scanners.

Even our bit-mapped packages are designed directly on the Mac with specific resolution and smoothing in mind. Our artists have been doing it that way for three years–I think the resulting images print far better than any scanned-in art of equivalent resolution.

Clip art is funny. There are no barriers to entry–anyone can buy *MacPaint* and a Mac and become our competition–but the questions of product quality, recognition, and breadth of distribution are important.

What are your biggest requests?

Christian images were our number-one request, and our latest package satisfies that demand. Sometimes here in Silicon Valley we think that we're the heart of the universe, but we're really not representative of the world. Religion is a bigger interest elsewhere.

Military and industry is another hot area. But it raises a moral question–whether I want T/Maker to support war efforts by providing clip-art disks of little hand grenades and rockets.

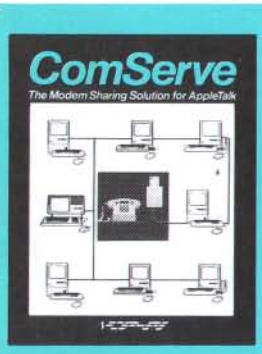
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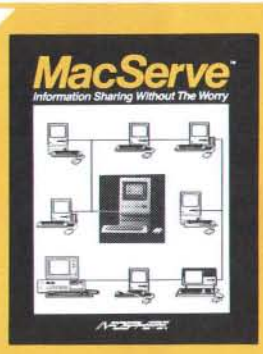
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In an ideal world there would be software to convert bit-mapped clip art into vector outlines, or to fill in gray scales.

wouldn't allow us to print an ad with a *Click Art* version of Michelangelo's David, so we put in a fig leaf for the ad.

What is the difference between PostScript/*Illustrator* clip art and bit-mapped clip art?

If you output our recent bit-mapped *Click Art* on a LaserWriter without alteri 3 the size, you couldn't tell the difference between bit maps and PostScript art. Of course, there's no gray-scale shading with bit maps.

The trouble with EPSF clip art is that it can't be used in all applications today. But it's increasingly needed in design and CAD. In our PostScript products, we try to create things that can't be done well in other formats.

PostScript provides advantages for sizing. We've enlarged an image so much that it takes up to nine pages, and it looks just as good as when it's printed in a small size. So we've tried to develop the most useful and popular PostScript images.

Will you do more PostScript-based clip art?

I think so. We find that the individual user wants a large selection of pictures. We have 125 images in the current collection. That brings up the other problem with EPSF: it takes a lot of disk space. Some of the images are so big that they won't fit into the Mac's memory for DTP placement. Most people seem to think the EPSF files are smaller than bit maps, but the EPSF file has all the bit-map information *plus* the PostScript information.

What about high-quality color clip art?

There is always a segment of the market that wants the best and the latest, but the average consumer wants images that print on the LaserWriter and the ImageWriter and can then be photocopied–in other words, no color. We're a consumer software company. The average guy doesn't buy the high-end products.

Is there a market for clip art on CD ROM?

There is an interest, but it is not an immediate focus for us. That's a high-end market, and ours is a general market. As soon as there are more CD ROM drives out there, we'll pay more attention. *Click Art EPS Images* is our first foray into the high-end market.

How about gray-scale clip art?

There are two kinds of clip art products: building blocks for the design professional and finished images for consumers who don't want to spend time designing art. In an ideal world there would be software that could convert the bit map into vector outlines or that could fill in gray scales for vector-based clip art, depending on what the user wanted. But that's not easy to develop.

How long before it's possible to convert bit-mapped images to outlines for LaserWriter output?

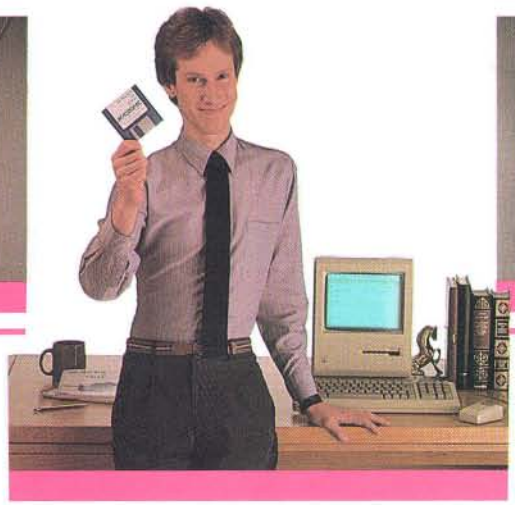
Remember that this kind of software will have to compete with what the eye and brain can do–simple things like distinguishing between a square and a circle that are interlaced. An eight-year-old can make that distinction, but it is very difficult for the computer. Add gray scale and noise, and the task becomes much more difficult. The eye automatically filters out the noise. How do you get a computer to recognize what makes up a face? Then there's image complexity. This is going to take some complex code. We're working on it.

(continues)

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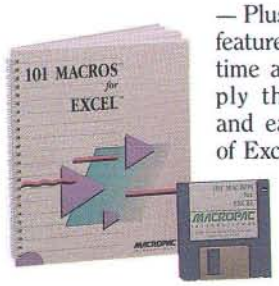


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MacIntosh™ Software Breakthrough:

How To Ship U.P.S.™ Without Paying For The Truck.



Daytona Beach, Fla.

It all started one day around 4:30 p.m.. As I sat in my office, I could hear the rumbling of the faithful UPS truck backing up in the shipping area. I felt sorry for the driver. We had a large shipment of heavy boxes that day and the temperature was in the 90's. The driver and our fulfillment manager were in for at least an hour of filling out forms.

That's when it hit me! Here I sit in front of my Mac, there's another Mac in accounting, one in customer service, and even one at the reception desk. **But we don't have one in shipping!**

"Surely someone has figured out a way to save time and money by using a personal computer for shipping". So I picked up the phone and called United Parcel Service. I learned that there are currently 22 UPS approved computerized shipping systems available. They range in price from $5,000 to $16,000! What you end up getting is some huge, expensive system with a whole bunch of hardware and software. (And as you've probably guessed, the systems are very IBM'ish.)

Undaunted, I continued my search. My Mac had slain the IBM Goliath in accounting, production, and customer service. It could do the same in shipping!

THE ANSWER.

I didn't want to pay $16,000 for a computerized shipping system. For that much I could buy my own UPS truck! The answer came in the form of a unique program called PWI ShipMate™ by Positive Works, Inc. It is designed for both the large, frequent shipper, and also for the occasional shipper. It's priced so that even individuals can afford it. The entire price is only $295, and best of all, it was designed for the MacIntosh. It does everything that the big systems do, except that you provide the computer and the scales. It does the rest.

SAVE TIME AND MONEY

No more forms to fill out by hand. No more charts or tables to look up. No more labels to fill out. All is done automatically at the touch of the mouse. PWI Shipmate™ fills out all tags, COD, AOD, manifests, and shipping labels. Paper work that used to take hours can now be accomplished in minutes. This software literally pays for itself in a matter of weeks by saving hundreds of man hours.

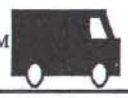
In addition, this unique program compiles complete customer files with all current data. The customer filing system boasts an auto lookup function that stores and retrieves information on all frequent shipments and customers.

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PWI ShipMate™ is available for $295 *(or $449 w/ Filemaker Plus)* from Florida Mrktg. Int'l., Inc. 142 Cone Rd. Ormond Beach, Fla. 32074. To order by credit card call 904-677-1918. You will need to have a working copy of Filemaker Plus™ to work in conjunction with PWI Shipmate™. Complete documentation, users manual, and customer support number are included with your program.

PWI Shipmate™  by *Positive Works, Inc.*

Circle 242 on reader service card

Verbatim

What do you think about some of the new non-PostScript hardware and software that will compete with *Adobe Illustrator?*

The key to competition is price/performance. If there is similar performance–that is, if the output you get from *PageMaker* (or your program of choice) is the same whether you use a LaserWriter or a GCC Personal Laser Printer–then you'll buy the cheaper printer.

I don't think that Apple's old customers (back when GCC's HyperDrive was the only hard disk) were brand-name shoppers. But now that Apple is selling to big companies, maybe the six-color logo on the box will mean something.

Why are there so few women professionals in this industry?

I don't know. I haven't found many barriers because I'm a woman. Most of the developers are glad to see a woman here.

Is it a problem or an advantage?

Both. A lot of this business is predicated upon personal relationships. Being a woman helps and hurts. Some people tend to remember me more than they might otherwise because I'm a woman. When it hurts, I have to pull out my Stanford MBA credentials to get my foot in the door.

What do you consider the burning issues in the market now?

For us there is the issue of whether or not a company our size can survive, or do we have to be big to stay in the market? Look at Living Videotext, Forethought, and other companies with a high profile in the Macintosh market that have been swallowed up.

We don't want to be acquired. We enjoy what we do here. So it would be great if it could go on as it has been. I have the best of jobs–a small group of the best people, lots of profit, different projects to work on. But if the industry changes too much, that may not be possible. There is a consolidation of our industry at present, and almost a consolidation of customers as well.

We're always evaluating our options. If remaining small becomes impossible or if the industry changes further, then we'll gladly pursue relationships with larger companies. We have products and talents that I'm sure could certainly benefit some of them. □

Interviewed by Jerry Borrell



MacTilt SE®

The Mac SE sitting on the desk leaves the screen too low for comfortable operation. MacTilt SE elevates the Mac 4" and provides 30° tilt and 360° rotation for better viewing and greater operator comfort. **$89.95**



The Muzzle™

The Muzzle protects your confidential files, documents, and other sensitive data. A locking bracket effectively prevents the Mac SE from being powered up, eliminating access to any data on the hard disk. The entire Muzzle can also be secured to a desk or workstation with a cable or chain to physically secure the Mac in place. **Muzzle $49.95**

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Everyone who needs the power of the Mac II also needs the space that the Monitor and Processor occupy. If there is no desk space to organize work and lay out projects, the Mac II's effectiveness is limited. The new Mac II Workstation takes a totally new approach to workstation ergonomics. This free standing workstation sits alongside your desk and provides a unique arm suspension system and shelf area giving the operator the ultimate in adjustability and space savings. **$499.95**

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With a silky-smooth, one hand motion, your Macintosh can be adjusted to relieve operator stress, ease neck, back, and eye strain, and increase productivity. The MacTilt elevates the Mac 4", and provides 30° tilt and 360° rotation at the touch of a finger. **$89.95**



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If you are an Imagewriter user, MacBuffer will automatically reduce the time the Macintosh spends waiting for the printer. In addition to less time spent waiting, MacBuffer enables two Macs to share one printer and has Local Copy and Single Sheet Mode. Get the most out of your Imagewriter I or II with MacBuffer. Call for pricing.

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For Apple Macintosh™ Network Systems For Tops™, Appleshare™ and Macserve™

Now, for your office automation the FS-100. The FS-100 is a fileserver which comes with a hard disk (261MB) and a 45- 60MB tape backup built into it. It is the latest in disk technology combined with the industry standard SCSI interface which offers optimism performance for your total network! The FS-100 is excellent if you use Tops™, Appleshare™ and Macserve™.

Features:

- Built-in 45-60MB tape backup with 90KB/Sec transfer rate
- Built-in 261MB hard disk with 23ms access time
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These high quality hard disks range from 20MB to 90MB. They come with a built-in SCSI intelligent controller and can transfer upto 1.5MB per second and are either MFM or RLL.

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- MFM/RLL recording method
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40MB 40ms	$949	$899
91MB 18ms	$1495	$1395



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Circle 593 on reader service card

Macworld News

by Gil Davis



MAX AGUILERA-HELLWEG

Hear ye, hear ye. All rise. Here comes the judge. He's Harry Anderson of NBC's "Night Court," whose somewhat zany–and Macintosh-infused–private life is a lot like his loony character's.

Night Court

Harry Anderson, better known as Judge Harry T. Stone of NBC's "Night Court," is also a magician and sometime Macintosh evangelist. Anderson has done magic tricks and street performing in North Hollywood since he was 16, and his exploits with computers also go back several years. He bought a VIC-20 on impulse, then a Commodore 64 and an Apple IIe. Next Anderson bought a Macintosh, and he's been a diehard Mac user ever since. He currently has 14 Macs, including a Dynamac and an SE, which he uses to keep his various projects and enterprises up and running. Livestock Productions, Anderson's production company, named for the magician's trick of pulling a rabbit out of a hat, and Anderson's Illusions, a magic and special-effects division (which turned a can of 7-Up into a basketball in a commercial with Magic Johnson), keep the stable of Macs in use.

Anderson even has a Mac in his trailer on the "Night Court" set, equipped with a modem so that he can communicate with his office. He uses the Mac to write and storyboard episodes of "Night Court," specials for NBC TV and HBO, and a book entitled *Games You Can't Lose and Bets You Can't Win* for Simon & Schuster.

Anderson's evangelism for the Mac carries over to other members of the "Night Court" team. He has convinced several of the actors and crew to buy Macs. And if you look closely as the camera pans Judge Stone's office, you'll see a Dynamac perched on a desk. The on-screen and off-screen characters share the same passion.

Beyond the Mouse

The mouse was once hailed as a revolutionary input device. Nevertheless, it still represents an imperfect liaison between the Mac's screen and the most intuitive input device of all: the hand. Three companies have recently demonstrated devices that provide a more direct means of manipulating information on screen.

Perhaps the most direct approach comes from MicroTouch Systems' Mac & Touch Screen, which enables you to use your finger to choose menu items, click on-screen buttons, and select and drag objects on a Mac Plus, an SE, or a Mac II.

Before this can work, a sheet of glass with a resistive coating must be placed over the Mac's screen. The touch-sensitive sheet controller senses the position of a conductive object–such as a finger–and records the position on a grid of 1024 by 1024 touch points.

In addition to offering a more natural interface than the mouse, a touch screen takes up no desk space, making it more convenient for public demonstrations where a mouse might be damaged or stolen.

A touch-sensitive screen is fine for dragging objects and pressing buttons on a flat surface, but imagine plunging your hand into the Mac's screen and moving objects in 3-D space.

The DataGlove Model 2 from VPL Research introduces a re-

(continues)

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MacroMind® Inc.

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markable user interface for simulating motion in three dimensions. The DataGlove is just that–a glove that senses hand gestures and transmits them to an image on the Mac's screen.

The glove is connected to a control unit that contains a position-and-orientation system, which records hand and finger movements. When you wear the glove and move your hand, a representation of a hand appears on the screen, duplicating your movements in real time.

The DataGlove can be used in areas such as human-factors engineering (the science of interfacing humans and machines) and telerobotics. It has already been used in conjunction with 3-D animation software from SimGraphics Engineering to simulate the movements of astronauts and equipment in a proposed space shuttle module. The DataGlove Model 2, which operates with the Mac Plus, sells for $8200–a small price to pay for this type of simulation in the microcomputer world.

Another unusual interface comes from Anatex. *Personal Writer 15* is a handwriting recognition system that translates written letters into typed text on the Mac's screen. The system works with word processors, graphics packages, spreadsheets, and page-layout programs.

Personal Writer comes with a digitizing tablet, a pen, and software that "learns" your handwriting. Numerous handwriting files can be saved, allowing more than one person to use the interface. As you write a word or phrase on paper, the text appears on the screen.

Two versions of the system are available: *PW 15 S* requires you to print letters in a grid format; the more flexible *PW 15 SL* doesn't restrict you to the grid. In addition, *PW 15 SL* not only reads your handwriting, but corrects your spelling with a 100,000-word dictionary. *PW 15 S* sells for $895, and *PW 15 SL* for $1395.

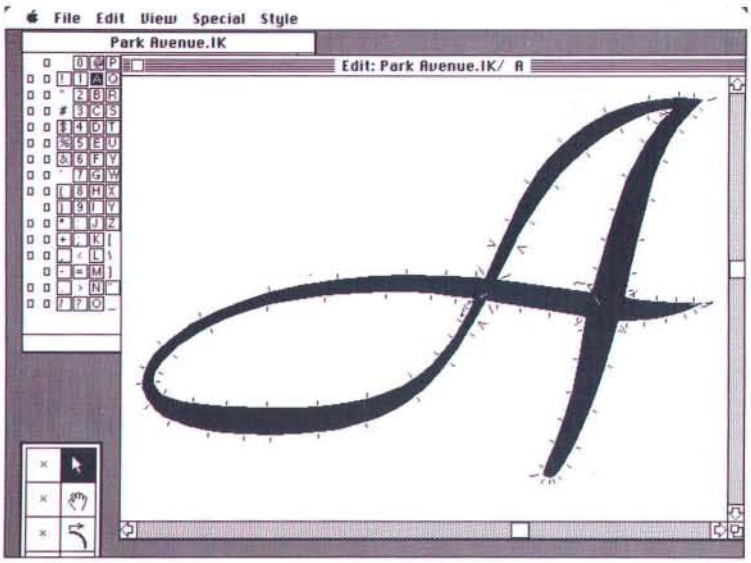
To some, returning to handwriting might seem a step backward; but to others, drawing and writing with a pen instead of rolling a mouse and pecking at a keyboard might be the natural way to compute.

For more information, call MicroTouch Systems in Woburn, Massachusetts, at 617/935-0080; VPL Research in Redwood City, California, at 415/361-1710; and Anatex in Los Angeles at 213/556-0151.
–Erfert Nielson

DAN ESCOBAR



The DataGlove hand can rotate a 3-D Mac image through three dimensions. More practical uses include remote-control handling of hazardous materials.



Designing an alphabet on* MacIkarus *is a matter of pushing and pulling on "handles" located on the font's outline.

Count 'Em, 1563 Fonts

Everyone familiar with desktop publishing is aware of the importance of fonts. But to some people, fonts are of particular interest. Graphic artists may have demanding clients who need a specialized font for their company's logo, or a publisher may want to use fonts to give a publication a particular "feel."

Up to now, most font-design systems have cost $100,000 or more, which is why there are currently only 40 Ikarus font-design systems in the world. So it didn't go unnoticed when Ikarus software modules were displayed on a Mac II at the Seybold Desktop Publishing Conference in September.

According to The Company of Boston, which represents the developer, URW of Germany, *MacIkarus* is a trial balloon to see if people want a Mac II font-design system that has a worldwide reputation and 1563 associated fonts–which is probably two to three times the number available from most other suppliers.

Font design begins with the display of a single character, which is then modified to suit the designer. Key parts of the resulting character–such as serifs, points, and accents–are automatically stored and carried over to the rest of the alphabet.

You can modify individual characters with the Ikarus editing system by placing points on the font's outline that can be dragged to new positions to create a new curve. The basic alphabet can then be expanded, condensed, italicized, changed in horizontal proportions, or given an outline and shading.

In addition, General Computer recently introduced Fonts

(continues)



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Plus–16 additional fonts for its 300-dpi Personal LaserPrinter, which uses QuickDraw as a page-description language (an AppleTalk connection is in the works). Fonts Plus lists for $299 and includes two additional headline fonts, Futura Extra Black and Cooper Black, plus five other fonts, ITC Avant Garde, ITC Bookman, Century Schoolbook, ITC Zapf Chancery, and ITC Zapf Dingbats.

Adobe Systems has also announced six new typeface packages, bringing its Adobe Type Library to 147 individual fonts. The average price per package is $185.

CasadyWare's most popular font is now Calligraphy, which is compatible with PostScript. For $69.95 (list), you receive Regency Script and Calligraphy Laser in 14-, 18-, 24-, and 36-point sizes, plus tips about how to install and use the extra fonts. For more information, call The Company in Boston at 617/439-5346; General Computer in Cambridge, Massachusetts, at 617/492-5500; Adobe in Palo Alto, California, at 415/852-0271; and CasadyWare in Carmel, California, at 408/646-4660.

Speeding Up Your SE



Accelerator boards are typically used in image and signal processing, high-resolution displays, 3-D solid-color graphics, artificial intelligence, and large relational databases.

Up to now, adding an accelerator board to your Macintosh SE cost $995 to $1899. But now you can speed up your SE using MacMemory's $599 Turbo SE. Although it uses basically the same 68000 processor normally found in the Mac SE, it runs at twice the speed–essentially doubling the SE's performance.

MARK JOHANN



Turbo SE doubles an SE's speed, giving users a taste of high performance. Add a math coprocessor for fast calculations.

For $399, you can obtain even more speed. According to MacMemory, plugging a Motorola 68881 math coprocessor chip into the Turbo SE board allows programs that use the 68881–such as *Microsoft Excel*–to run up to five times faster during calculations. Pure math computations have reportedly been clocked at 60 times previous speeds.

Levco's $395 CacheCard and the Turbo SE function similarly, except that CacheCard also includes a 16K RAM cache that feeds the most frequently used instructions and data directly to the 16-MHz processor rather than to the much slower processor on the SE's system board.

At the high end of the accelerator-board market is Levco's TransLink parallel processing system, which puts the power of the VAX 8600 mainframe into the SE or the Mac II. The heart of the TransLink system is the INMOS Transputer–a high-speed, 32-bit parallel processor with a throughput of 10 million instructions per second (MIPS), in comparison with the 2.5 MIPS of the standard Macintosh II. Multiple Transputers can be plugged in to create a supercomputer throughput of 200 to 300 MIPS, according to Levco.

A TransLink starter kit retails for $2499 for the Mac II and $1899 for the SE, and includes a software tool kit. Additional Transputer modules cost from $1299 to $3499, depending on the module's clock speed; memory; and optional on-chip, floating-point math coprocessor.

For more information, call MacMemory in San Jose, California, at 408/922-0140; INMOS Corporation in Colorado Springs, Colorado, at 303/630-4000; or Levco in San Diego, California, at 619/457-2011.

Shhh, Don't Tell the Competition



Harvey Andres has kept his secret weapon secret about as long as he can. Now the word's getting around to the competition that he's using a Mac to win contracts in an unusual way.

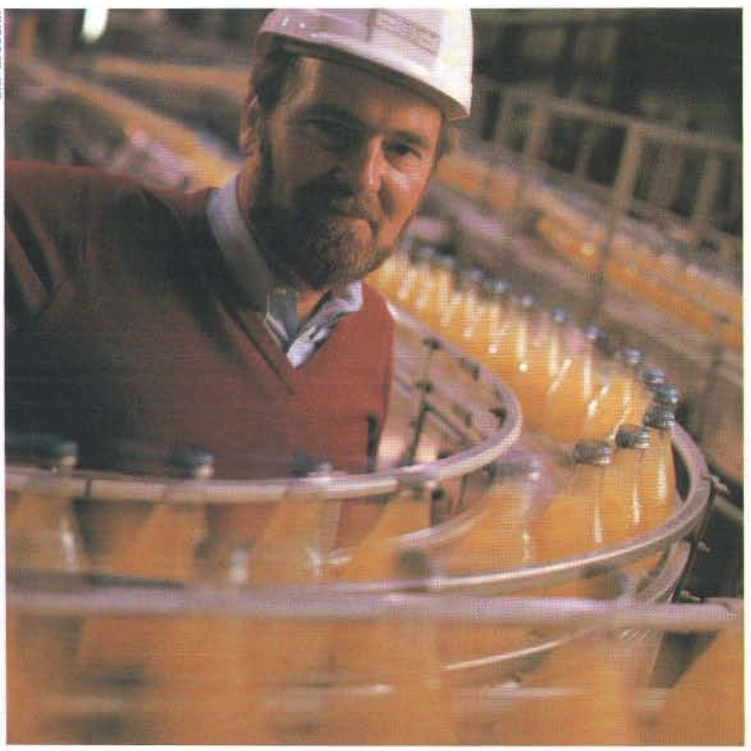
Andres–of Andres and Associates in Bethel Island, California–bought a 512KE two years ago to create client mailing lists. Soon after, he began experimenting with *MacPaint*.

Before long he realized he could use the program to design food- and beverage-industry processing plants. With *MacPaint* Andres could easily depict conveyor belts, bottling machines, and their enclosures, and then print the results on an ImageWriter.

It was a good idea that got better when Andres began taking his Mac along when he visited clients. "We need three more feet between the conveyor and that wall," a client might say. Andres would turn to his Mac and make the change within seconds, satisfying his clients because their plants were designed "their way."

Andres calls his secret *client-aided design*. But it's not a secret anymore.

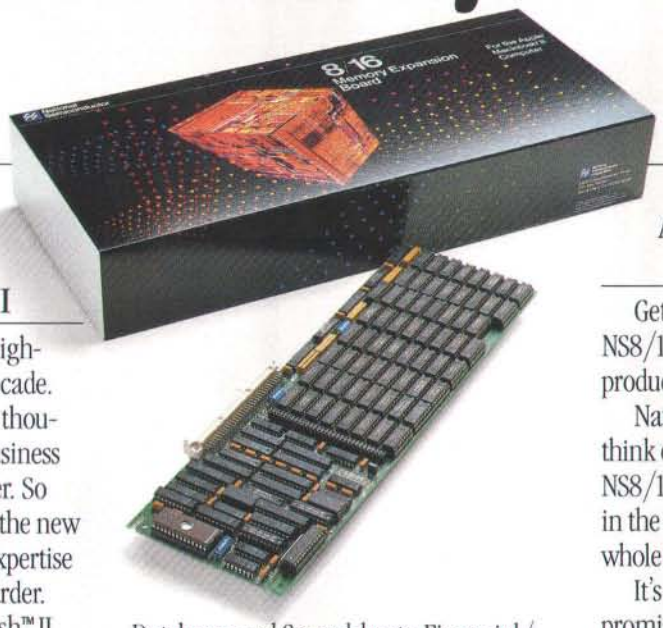
DAN ESCOBAR



Harvey Andres wasn't shy about his new Mac, so he took it along when visiting clients. Everything went fine till one crusty worker shouted, "Are we buying a conveyor line or a computer?"

National Semiconductor

We were ready for the Mac II almost before they were.



INTRODUCING THE NS8/16 MEMORY EXPANSION BOARD FOR THE MACINTOSH II

National has been providing high-level add-in products for over a decade. We've helped well over a hundred thousand multi-tasking, multi-user business environments run faster and better. So even before Apple was ready with the new Mac™ II, we were ready with the expertise and technology to help it work harder.

In fact, we viewed the Macintosh™ II as an 'open' invitation to provide power users with the right tools. And now we're proud to introduce the NS8/16 Memory Expansion Board.

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National is the company you should think of for add-in products. Now, with our NS8/16 Memory Expansion Board. And in the future — you can expect to see a whole line of add-in products for the Mac II.

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FOR MORE INFORMATION CALL THE COMPATIBLE PRODUCTS GROUP AT 800-345-4006 OUTSIDE OF CALIFORNIA CALL 800-538-8510

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Circle 196 on reader service card

Mac with Teeth

With the versatility of the Macintosh computer, good software is sometimes used for applications not dreamed of by its developers. *ToothPics* was developed by Class One Limited in Tempe, Arizona, to provide dentists with an easy way to enter their patients' information and run their practices.

ToothPics pioneered the on-screen dental chart in which a dental assistant uses the mouse to select teeth and procedures. Older systems required that all



The Macintosh helped forensic experts identify airline crash victims quickly.

entries be typed, a mistake-prone and time-consuming process.

Dr. Steven Smith, chair of Northwestern University's forensic dental section, saw a new application for *ToothPics.* Upon his request, Class One donated to the university a modified version of the program that allowed charting information to be transferred as a text file. Standard database programs could then be used to match existing dental records with human remains.

When a major airline crash occurred in Detroit, Dr. Allan Warnick, chief forensics Odontologist of Wayne County, Michigan, asked Dr. Smith and his colleague Dr. Larry Pierce to set up and run forensic computers at the crash site. Apple immediately airlifted in two Mac IIs. The Mac IIs and several locally donated Macs were networked in the forensics hangar. The Macintosh lived up to its reputation for ease of use: volunteers were trained and charting dental records within an hour of arriving.

With the aid of *ToothPics'* charts and a list of most probable matches (generated on *4th Dimension* by database expert Forrest Lorz of Maryland), the forensics specialists began to identify the victims.

One FBI expert, upon seeing the devastation of the crash, had estimated that it would take three weeks before all the remains could be returned to the families. But in this case, the forensic team completed the crash site identifications within six days of the accident–129 of the 156 victims were identified by dental records.

"This is the first time that computer dental graphics have been applied to assist forensics in a large-scale disaster," said Class One president Bert Cutler. "We are pleased that our dental office product could be adapted and used in such a high-pressure environment.

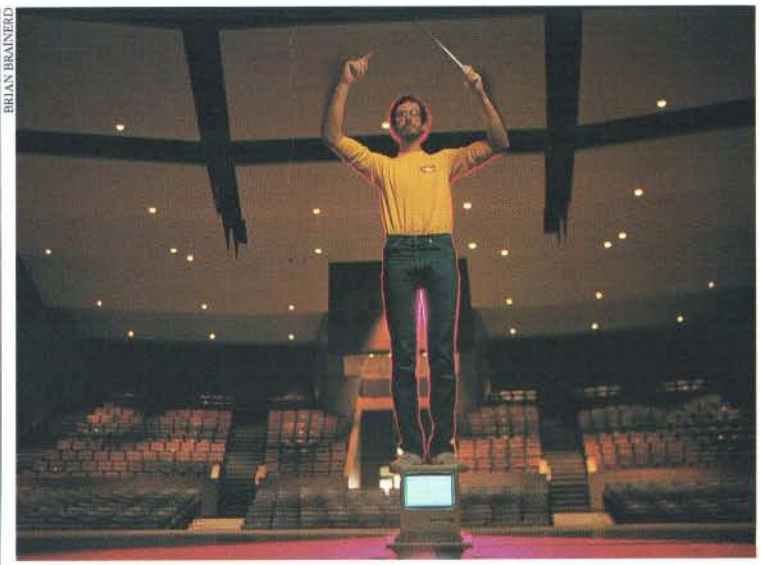
"Forensics is not an area that one would normally associate with business software, and it has been gratifying to be able to serve these families."

Seeing Sounds

Using a Mac, it's now possible to *hear* a room even before it's built–a real advantage for acoustical engineers who might be called on to design anything from a home entertainment center to a concert hall.

Using a new program called *Modeler,* a sound engineer can convert drawings of a room's shape and information about its building materials into a model of its acoustical properties. The engineer can then alter this model to achieve a representation of the desired acoustical environment.

BRIAN BRAINERD



Tom Birkle conducts a nonexistent orchestra. No sound source is necessary because his acoustic simulation program needs only a Mac.

First *Modeler* enables the engineer to situate up to 100 groups of electronic speakers on the plans using a click-drag procedure. Speakers are positioned using three-dimensional coordinates.

Modeler then calculates direct-field, reflected, or direct-plus-reflected sound prior to producing a presentation-quality graph that superimposes a sound-pressure-level map on the floor plan. Modifications can be made to speakers, room dimensions, and materials to "tune" the room for the desired sound.

"*Modeler* makes an excellent sales tool because clients get involved in designing their own sound systems, using easily understandable graphs," says Tom Birkle of David L. Adams Associates in Denver, Colorado. Birkle codeveloped the acoustical simulation program with Bose Corporation, which licenses it to more than 200 commercial sound contractors and design firms worldwide.

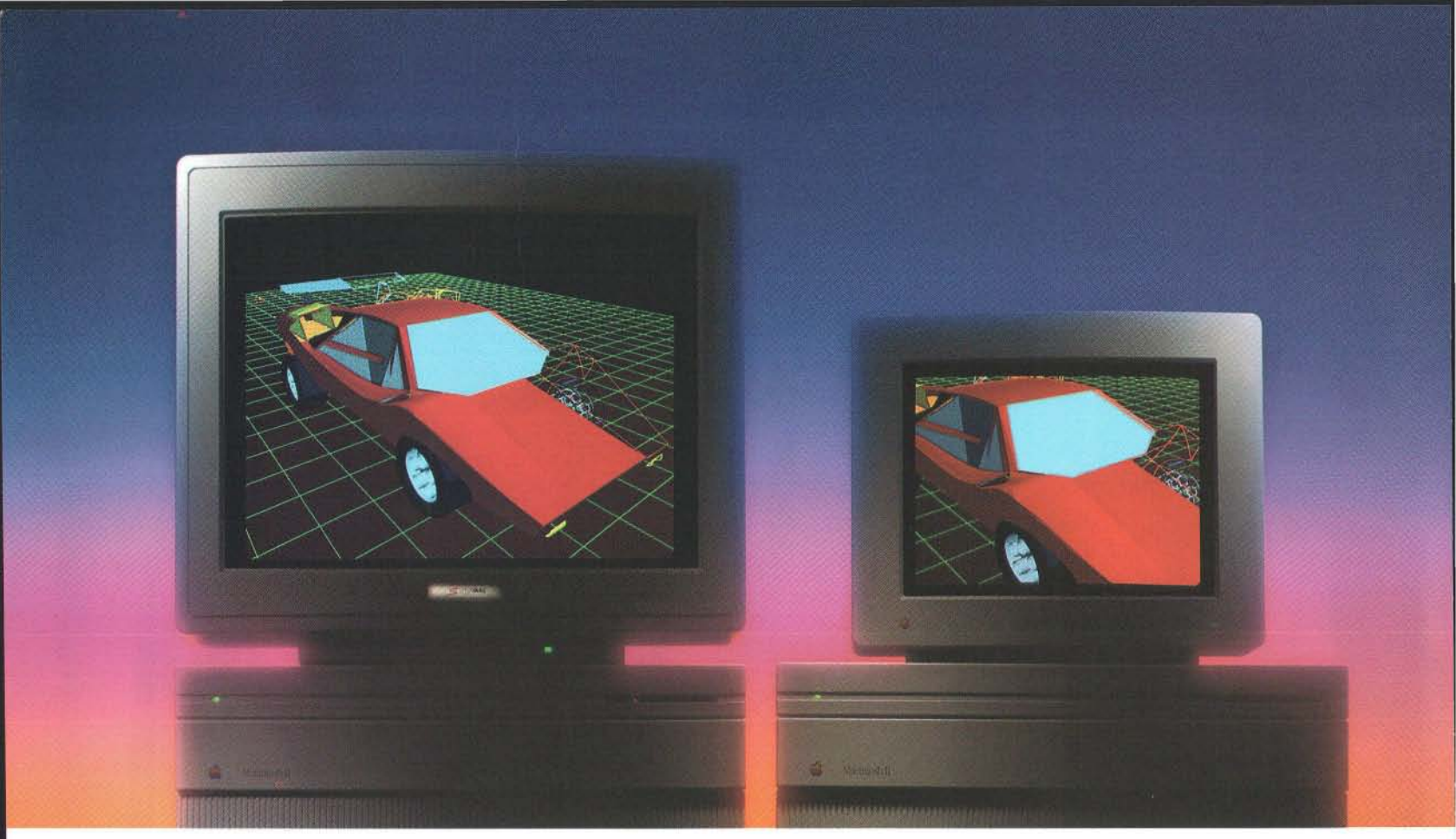
Modeler works on everything from a 512K to a Mac II, where it runs about five times faster than it does on a Plus because of the Mac II's math coprocessor. For more information, call Bose in Framingham, Massachusetts, at 617/879-7330. *–Craig O'Donnell*

Big Screens, New Choices

Five new entries into the black-and-white large-screen market bring Mac enthusiasts new capabilities.

Perhaps the most dramatic of these new offerings also has the smallest screen: 17 inches, versus 19 inches for the other four. But what E-Machines' The Big Picture IQ lacks in size, it makes up in image quality by bringing the Mac II 256 levels of gray, compared with the one level of gray displayed on a Macintosh Plus or SE. High-quality photographs can now be scanned, displayed on the screen, modified electronically, and then pasted into page

(continues)



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Available only from SuperMac Technology.

Graphics *power* that turns a great *computer* into a great *workstation*. The result: The ultimate system for running Mac software. Because it is, simply, the ultimate Mac.

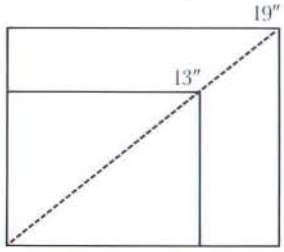
How to create the Macintosh workstation:

Just install one of our workstation video boards in any Mac II slot.

Then connect your monitor. Turn on the power, and you're *running*. No special software. No jumpers.

For color, our *Spectrum*™ system brings you 1024 x 768 resolution with up to 256 glorious colors at once, from a palette of over 16 million. Or 8-bit gray scale, if you wish.

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Spectrum offers double the visual area of Apple's color display. So you see much, much more of your work.

Because SuperMac video boards are programmable, you can even start small and upgrade later. Choose from Apple's 640 x 480 monitor, or choose an 800 x 600 multisync-type monitor for 50% more resolution. Or for the ultimate workstation, choose SuperMac's 1024 x 768 19″ workstation monitor.

See SuperMac video before you commit to *any* video for your Macintosh II.

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Only SuperMac video gives you your choice of monitors, up to 19 inches.

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See SuperMac video at your nearest SuperMac video dealer. And see the difference between a great computer and a great *workstation*.

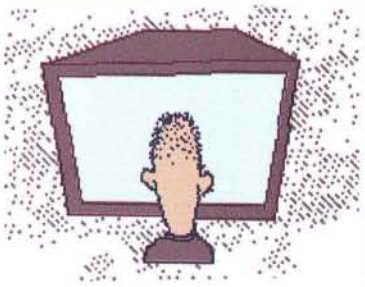
SUPERMAC TECHNOLOGY

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Trademarks: Macintosh: Apple Computer Inc. Image by Markus Houy using *Dimensions*.

makeup applications for magazine-quality results. The Big Picture IQ lists for $2895 and offers 1024- by 808-pixel resolution.

Although the LaserView from Sigma Designs offers only four levels of gray, with 1664-by-1200 resolution, it's capable of emulating workstation performance—resulting in 11 times the number of pixels displayed on a Mac SE screen. The LaserView lists for $2395 for the Mac II and $2295 for the SE.



Another ultra-high-resolution display is the Vista 1600 from Cornerstone Technology, which features 1600-by-1280 resolution and costs $2195. Also listing for $2195 is the Viking 1 by Moniterm, which is plug compatible with the Mac II and the SE (and with IBM's PC, XT, and AT) and features 1280-by-960 resolution.

Looking a lot like the Vista 1600 is Radius's $2395 Two Page Display (TPD). But don't be fooled, Radius only borrowed the bezel around the front edge—the insides are completely different. The TPD offers 1152-by-864 resolution and simultaneous use of the SE's screen—a feature Radius introduced a year ago with its Full Page Display.

The TPD also has a number of unique features built into the hardware: tear-off menus for all programs, a magnifier, an enlarged menu bar, and the ability to bridge the two screens so the cursor flows from the TPD to the Mac screen without interruption.

For further information, call E-Machines in Tualatin, Oregon, at 503/692-6656; Sigma Designs in Fremont, California, at 415/770-0100; Cornerstone Technology in San Jose, California, at 408/433-1600; Moniterm in Minnetonka, Minnesota, at 612/935-4151; and Radius in San Jose at 408/434-1010.

The Profits Motive

Button Down Software's *Profits* promises to be a program that will sell Macs to a group previously thought to be thoroughly entrenched in the MS-DOS environment. *Profits* will appeal to stockbrokers and active traders because it offers technical tools that have not previously been available on any personal computer.

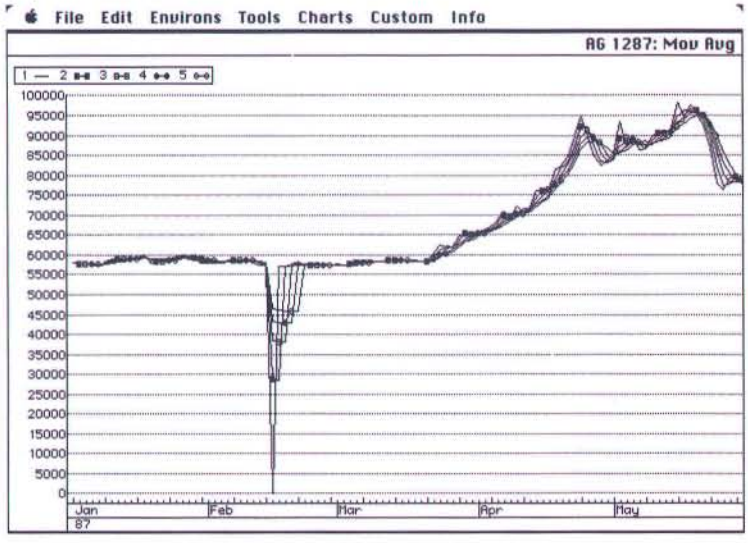
Profits instantly creates charts that can be customized in a way that's both innovative and consistent with the Mac interface. It even coins a few new terms in the process; *chart suites* is one. Chart suites preset the program to open as many as six prespecified types of charts at once, or the same type of chart for six different stocks, commodities, mutual funds, or indexes.

Quotes can be downloaded from Dial/Data or CompuServe directly into specified charts and printed in a number of ways. The charts are enlarged when printed in order to take advantage of paper size; one or more charts can also be printed on a single page.

Profits allows you to set alarms, so that a bullet will automatically be placed on your charts to alert you to whatever activities you specify.

The Mac II brings out the full potential of this program, with its larger screen size and its customizable color environment that can better distinguish between different trend lines on the same chart.

Although the package does include some basic information about technical analysis, it's really designed for the serious trader—if only because of its price. But with a staggering number of customizable charts, as well as the refined trend and momentum indicators available for the first time to personal computer users, the $495 price could be money well spent for a portfolio manager in need of technical tools.—*Linda Joan Kaplan*



No, this isn't a chart of Black Monday's stock crash—but it could have been. Serious technical traders predict the future using* Profits' *charts.



JOYCE RAVID

Because John Farago looked ahead, students can now plug into a network easily.

Mac Law School

Five years ago, when John Farago and two others founded the City University of New York (CUNY) Law School at Queens College to specialize in teaching public interest law, they knew computer access was going to be important to faculty and students alike. So Farago insisted that the campus's one building be wired as if data were a utility—just like electricity—with computer-network-access outlets throughout.

Last summer, the school's computer system was rebuilt from scratch. Now there are 150 Macintoshes, 27 LaserWriters, 70 DEC Rainbows, and 3 DEC MicroVAX II computers ready to accommodate about 450 students and 150 faculty and staff members.

All these computers are attached to the CUNY computer network, an Ethernet backbone connecting 16 AppleTalk networks (configured with Farallon's PhoneNet and accessed with Kinetics' FastPath) to the MicroVAX systems. With Pacer's

(continues)

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-Neil Shapiro, Editor-At-Large, MacUser, Chief Sysop: MAUG

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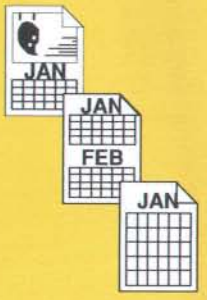
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- Nibble Mac, October 1987



"Every year I have the same problem: finding the ideal calendar... In answer to this universal dilemma CE Software has published CalendarMaker." MacWorld, March 1987

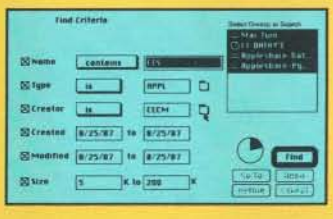
4-1/2 Mouse rating. MacUser, December 1986

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"DiskTop may well be the best desk accessory I've ever owned; I use it more than any other....this may be the best value in Macintosh software today."
Max Vizla, The MACazine, November 1987.



4-1/2 Mouse rating-MacUser, August 1987.

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PCLink, students access DEC's E-mail program, *VAXmail,* to send messages to faculty members. They can also transfer files between the Mac and VAX systems.

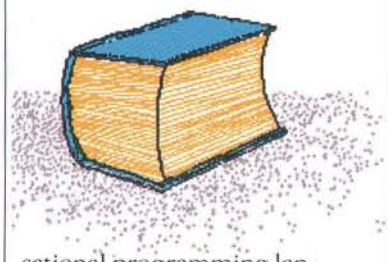
In addition to accessing the MicroVAX systems, students use the Mac for word processing, desktop publishing, and communications. Each of the 11 section libraries at the school has four Macs used specifically to access Westlaw, a law database.

Software programs are available on two of CUNY's *AppleShare* file servers, one of which is a Mac II with an 80MB hard disk. Programs and documentation are also kept in the school's main library for students to check out as necessary. In the study areas–student cubicles and even the main library desks–network connections are plentiful so that students can bring in their own computers to connect to the school's network.–*Brita Meng*

The Complete HyperCard Handbook

Some software programs have all the luck. For instance, on the day *HyperCard* was released, an equally groundbreaking guide book was made available. While Bill Atkinson and friends were inventing *HyperCard,* Danny Goodman was right there, trying out the results and writing them up in *The Complete HyperCard Handbook.* The purpose of this collaboration was to demystify a complex and hard-to-describe program.

HyperCard's dual nature makes the task of composing a worthwhile handbook even more challenging. On its face, *HyperCard* provides a versatile method of constructing a database you can easily navigate using visual cues. Under *HyperCard*'s surface is a language called HyperTalk, which Atkinson cowrote with Dan Winkler. HyperTalk is an almost conversational programming language that makes creating Macintosh programs possible for all of us. *HyperCard,* in effect, allows you to fiddle under the hood of the elegant Macintosh interface.



The Complete HyperCard Handbook serves both powerful functions admirably. It's a tome of 700 pages, fluff-free and exhaustive. It treats such subjects as the mechanics of making cards and assembling them into *stackware;* creating links; and writing instructions in HyperTalk.

Goodman's book also provides in-depth coverage of another *HyperCard* surprise: a multifeatured paint program. Even if you don't normally use paint programs, you'll find yourself creating graphics in *HyperCard* regularly.

Although *The Complete HyperCard Handbook* was not meant to be a reference book per se, it can be used as one. I was involved in a small group whose task was to convert the entire *Whole Earth Catalog* into many thousands of *HyperCards.* We were able to pick up a number of tips from the *Handbook.*

HyperCard, with its tools-for-making-tools structure, is simply one Macintosh program that you won't be able to exploit fully without supplemental help. For the immediate future, this is the book to get.
–*Kevin Kelly*

MacCray or CrayMac?

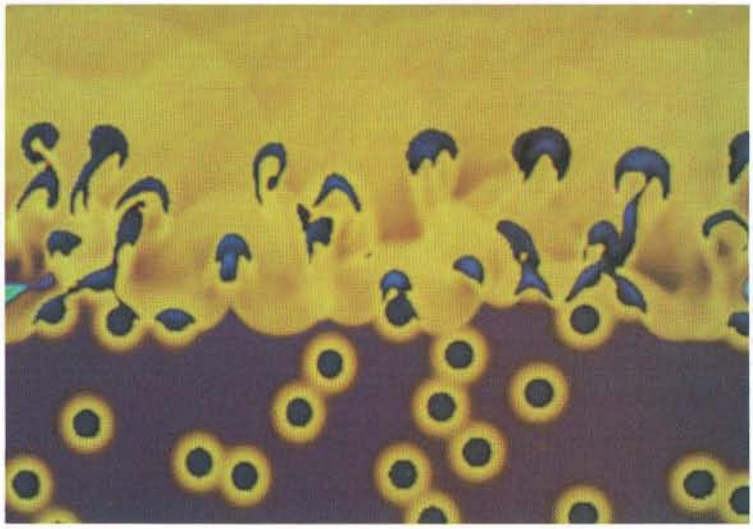
According to Brand Fortner, special programs coordinator at the University of Illinois's National Center for Supercomputing Applications (NCSA), the center is "bringing supercomputer power to the masses." Well, at least to those owning a Mac and some communications software. That's all it takes to plug into the center's new Cray X-MP/48 for a connection that puts the Mac at the forefront of computerized scientific research.

Here's how the Mac-Cray interface works: when you log on, the Cray appears as a window (or windows) in MultiFinder. Instead of an application program, however, each window leads you into a session on the Cray. You can prepare processing jobs on the Mac, send them via NCSA Telnet to the Cray for processing, get the results up to 100,000 times faster than with a Mac, and then cut and paste the data into other programs. Supercomputing results have never been so easy or convenient.

The Cray's present operating protocol will be replaced by the Cray Finder, a simpler, icon-based environment like the Mac's. In addition, users will have access to the NCSA's new image-processing program *Imagetool,* which anticipates the move from numbers (bytes) to images (megabytes) as the basic unit of computerized scientific data–a move that's necessary because of the almost incomprehensible volume of numbers yielded these days by scientific research.

Astrophysicist Mike Norman developed *Imagetool* to interpret his unmanageably complex data about extragalactic jets. The program translates that data, which would otherwise take a bewildering matrix of graphs to represent, into graphic simulations in motion.

Imagetool, along with the Cray Finder, should be part of the Mac-Cray interface in just a month or two. Even at its present stage, however, the interface is like starting up a Volkswagen and finding yourself flying a jet.–*David Dobbs*



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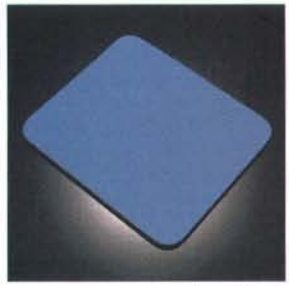
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Circle 373 on reader service card



Some may call it electronic slide storage. But the ability to paste 16.8 million colors into a page layout has major implications.

Great Color, Lots of Storage

Every once in a while, technologies come together and wonderful things happen. This time, they're happening to color on the Macintosh.

Color began on the Mac II with Apple's video card, which displays up to 256 colors on the screen–very impressive. Then, as soon as Apple began ramping up production of the II, we heard about video cards offering up to 16.8 million colors. The result was photographic-quality images suitable for many demanding applications.

Think of the potential market: all those magazines, catalogs, advertisements, newsletters, brochures, annual reports...even newspapers. They could use more color at reduced cost if they could computerize the processing and pasteup of color images.

But because each color image can require 1- to 4MB of memory, lots of mass storage was needed. Now, that storage technology is coming to the Mac in the form of optical memory called WORM (write once, read many), which can hold 50 gigabytes of information in a changer that holds 50 WORM disks.

MicroDynamics is putting it all together using a 24-bit color video card from Raster Ops. Here's how it works. A color slide is scanned, and the electronic image is displayed on a Mac II using the video board. The image is then stored on the WORM drive. Later, the image is recalled to the screen, processed, cropped, and pasted into a page layout. Other software will create the color separations, and the resulting negatives will be ready for the pressroom. For further information, call MicroDynamics in Silver Springs, Maryland, at 301/589-6300 or Raster Ops in Cupertino, California, at 408/446-4090.

This Little dBase Went to Market

Finally, after being announced over a year ago, Ashton-Tate's *dBase Mac* is on dealer shelves. The program supports color on the Mac II and utilizes files directly from other *dBase* applications–important because the *dBase* family makes up over 60 percent of the United States retail database market, according to Ashton-Tate.

Much of *dBase*'s success can be credited to the hundreds of developers who have written custom applications since *dBase II* was introduced for CP/M computers in 1982. These developers haven't been forgotten in *dBase Mac,* which includes a "protect" mode to keep users from altering the custom-written code. A run-time version of *dBase Mac* is being prepared so applications can be utilized by a developer's clients without their having to buy the more expensive *dBase Mac.*

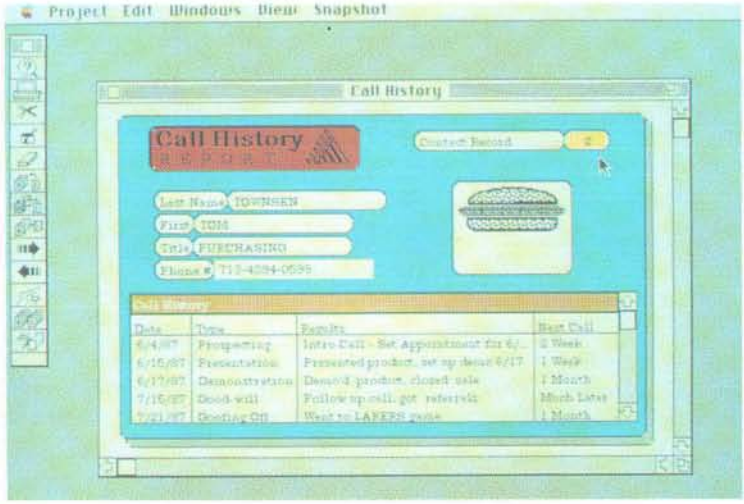
Using *dBase Mac,* you can export and import data to and from *Microsoft Excel, Microsoft File, 1-2-3, Omnis 3 Plus, Double Helix,* and *Framework,* all via ASCII text files.

Former versions of *dBase* required learning a high-level programming language. But through use of the Macintosh graphics interface and extensive pop-up menus and dialog boxes, *dBase Mac* performs many database functions without requiring programming. That doesn't mean a manual won't be needed–as with any complicated program, there's much to explain. If needed, the programming language is available for direct database manipulation.

Ashton-Tate maintains that while all other Macintosh databases provide only one-way relationships between data, *dBase Mac* is a truly relational database because it establishes two-way relations between various fields. Other features offered by *dBase Mac* include a virtually unlimited number of files and reports with custom formatting and graphics.

The $495 price of *dBase Mac* positions it squarely against Odesta's *Double Helix* and Blyth's *Omnis 3 Plus.* Higher up the price ladder is Acius's *4th Dimension,* which lists for $695 and offers multiuser functionality for networked applications.

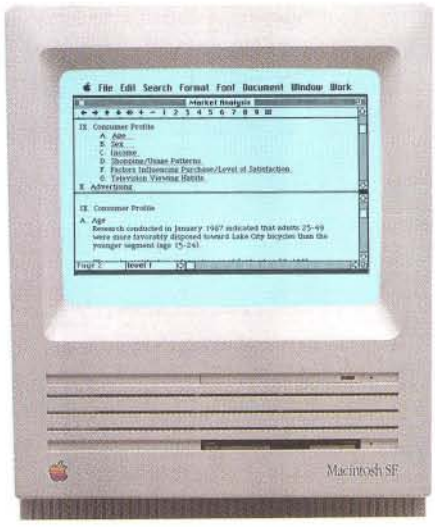
Early purchasers of *dBase Mac* reported they were unable to get the application templates manual and disk promised on the warranty registration card. Ashton-Tate told *Macworld* that it was indeed unable to supply the manual and disk until some two months after shipping the program. For more information, call Ashton-Tate in Torrance, California, at 213/329-8000. □



dBase Mac ***features an advanced relational database. Its reports, designed using drawing tools, can include photos, drawings, and bit-mapped images for a customized look.***

Hurry up and

Whether it's a two-page letter or a 100-page report, the whole point of writing is to get to the point. And nothing gets you there faster than Microsoft® Word, Version 3.



Moving an outline heading moves its associated text. So you can not only organize your thoughts, you can quickly rearrange your words, too.

That's because Word is not your ordinary word processor. In fact, it's not a word processor at all.

Word is the Macintosh™'s first document processor.

And it's specifically designed to take you from outline to output, without getting you bogged down in details.

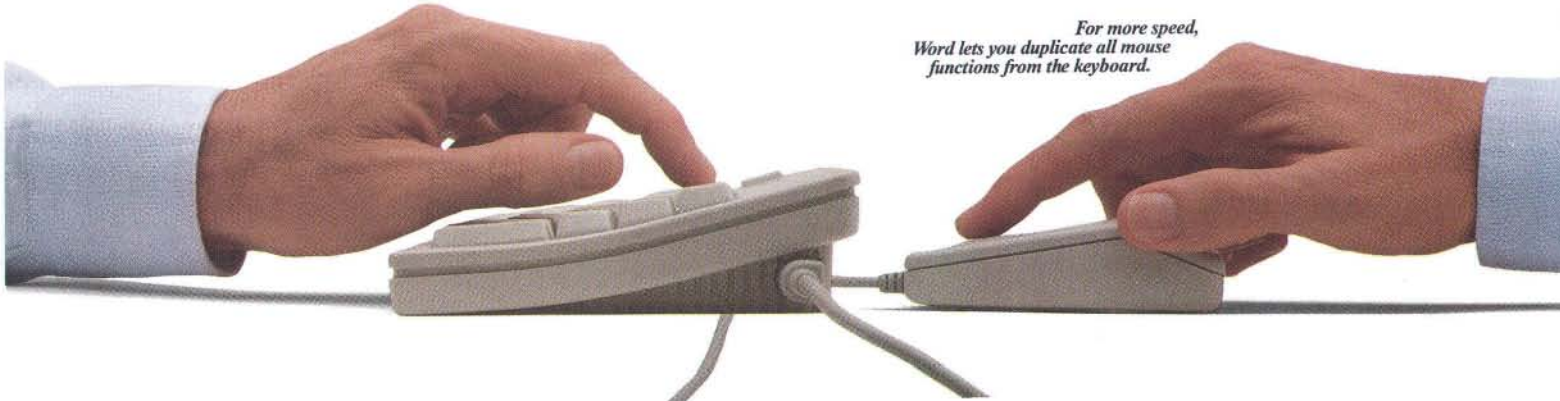
That's why you'll find a combination of powerful features in Word you won't find anywhere else.

Like an integrated outliner for organizing your thoughts. And for rearranging pages of paragraphs with a simple click of the mouse.

Likewise, a simple mouse clic is all you need to check and cor rect your spelling, using Word's built-in, customizable 80,000-word dictionary.

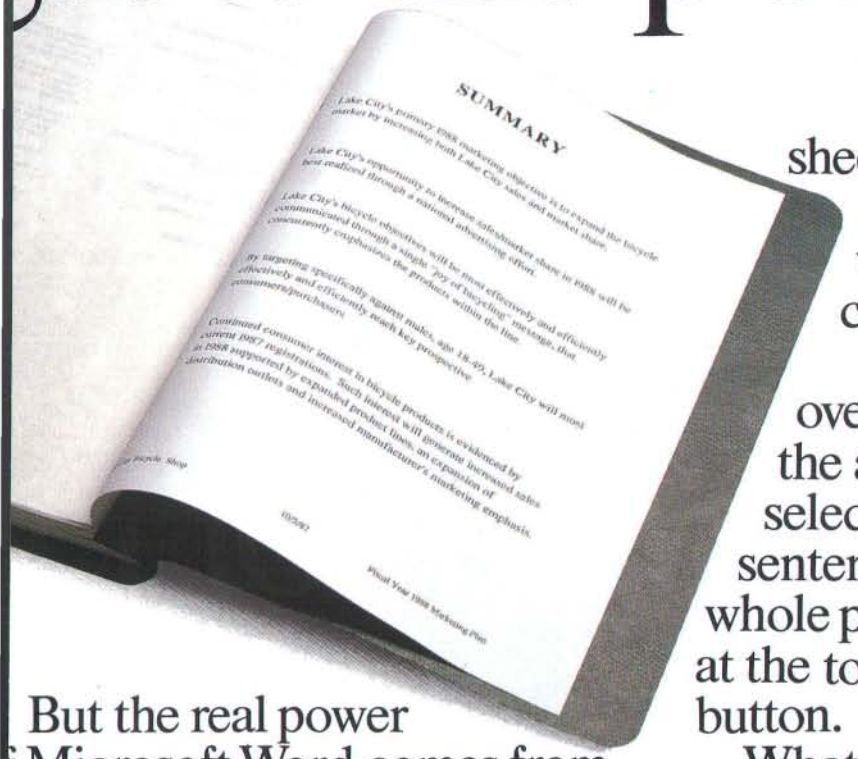
Plus you can preview and adjust page layouts before you print. Customize menus, so the files, fonts and formats you need are always at hand. Even assign Word the time-consuming chore of generating a complete index and table of contents.

All critical, professional features that strip hours off the task of turning rough thoughts into crisp, persuasive documents.



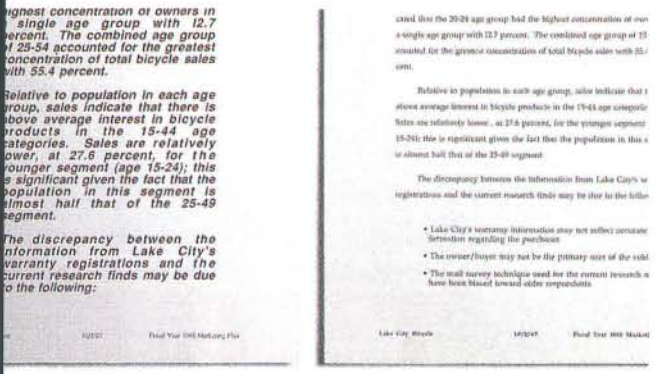
For more speed, Word lets you duplicate all mouse functions from the keyboard.

get to the point.



But the real power
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nd format your work.

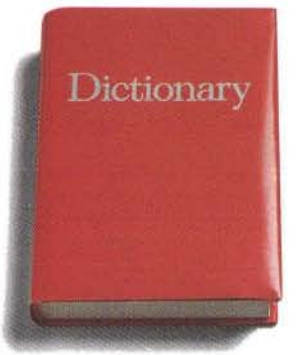
Advanced features, like com-
nand and accelerator keys, that



th style sheets, you can change from one format nother with just a click of the mouse.

uplicate every mouse function
hile you keep your hands on
ne keyboard. Glossaries, for re-
alling frequently used text with
few rapid keystrokes. Style
sheets, for saving and reusing
type styles and formats
with a simple point and
click.

And obvious, but often
overlooked time-savers, like
the ability to
select words,
sentences or
whole paragraphs
at the touch of a
button.

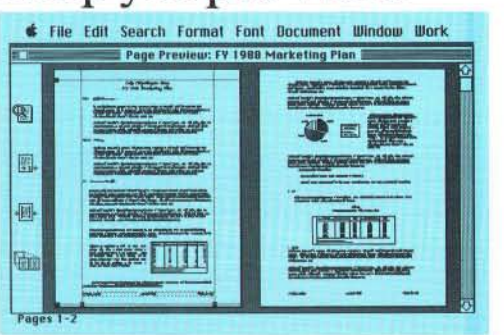


What's the difference between Word's built-in spelling corrector and a secretary with a dictionary? How about a couple of hours.

What can
Word do for you?
The answer can
be found at your local Microsoft
dealer. For the address of one near
you call (800) 541-1261, Dept. B65.

Ask him to help you put Word
to work in
preparing
your most
complicated
documents.

And in no
time at all
you'll reach
your own conclusions.

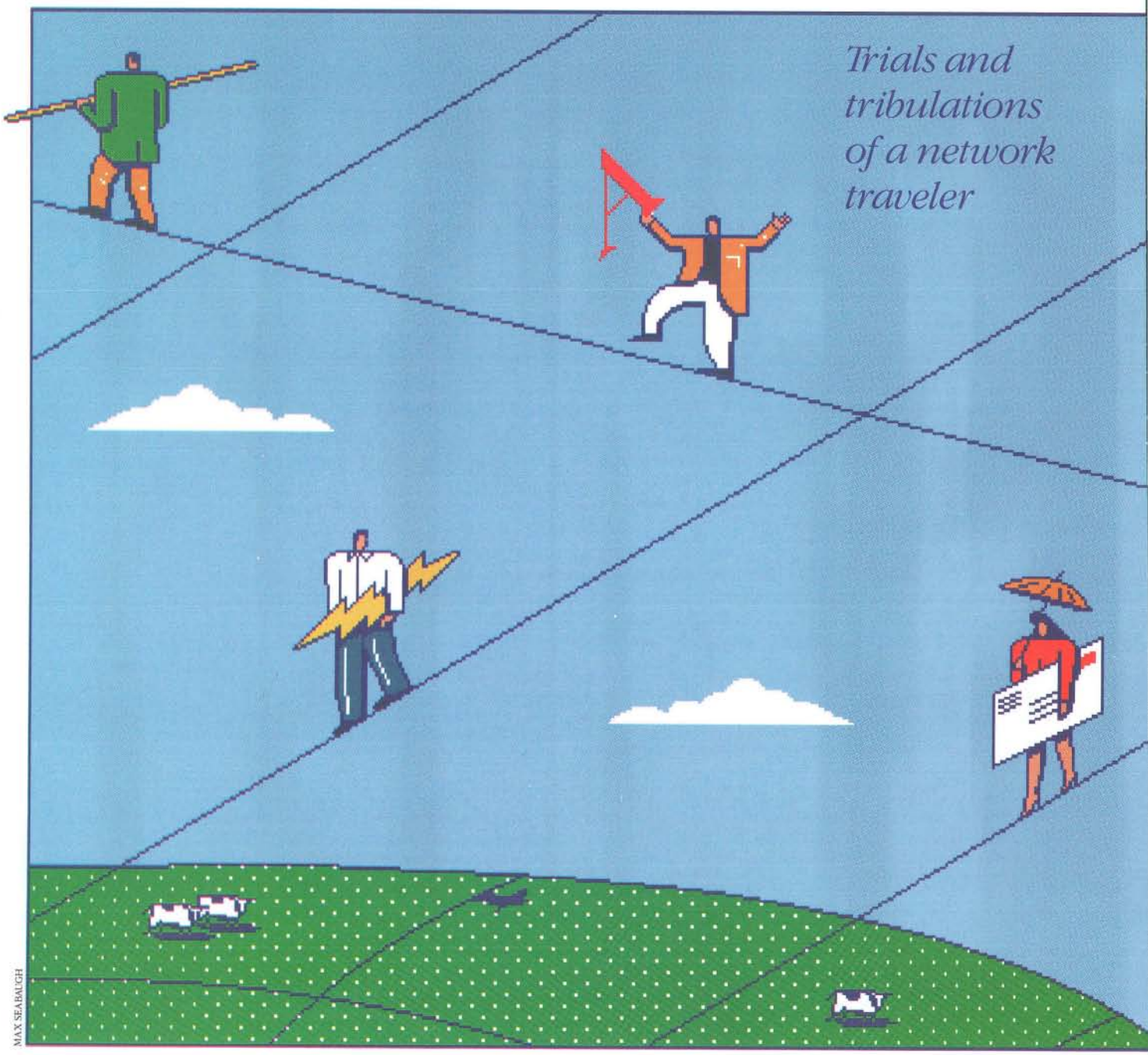


Page preview saves you endless trips to the printer because you can revise page breaks and margins before you print.

Microsoft® Word

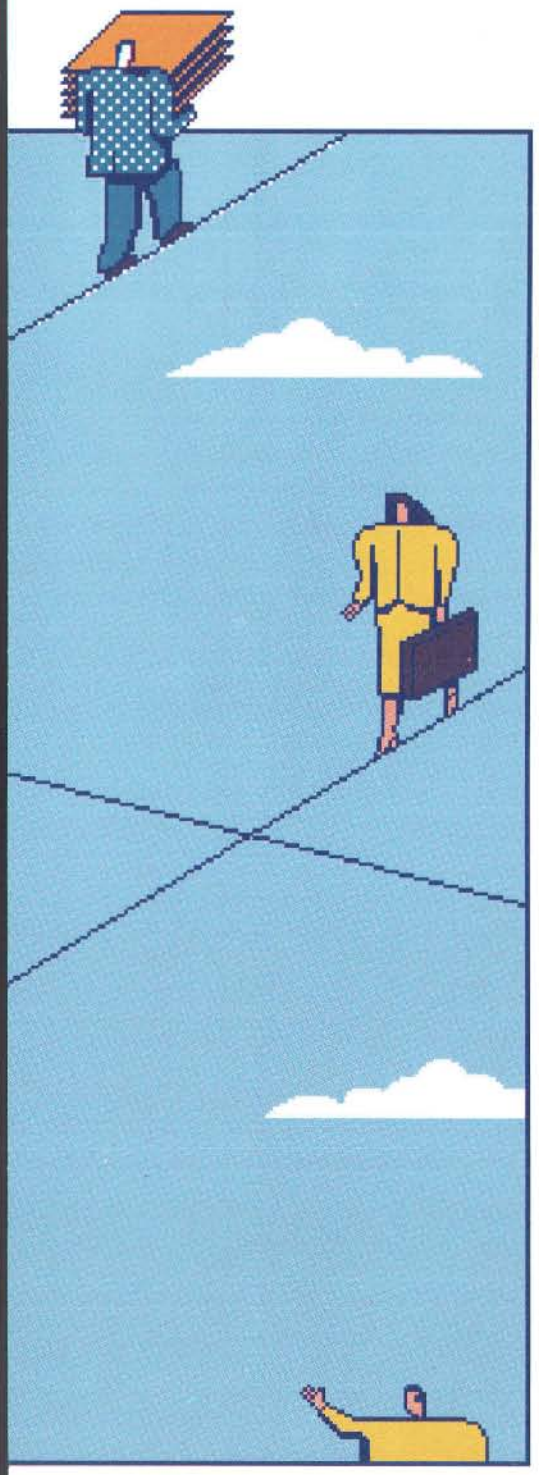
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Network Tales



MAX SEABAUGH

by David Ushijima



Networks, we have been told, are the wave of the future. Sun touts the network as *the* machine, and Apple's John Sculley predicts a shift to networks as the epicenter of computing power. The problem, though, is that networks aren't as easy to get running as they are to sell.

At *Macworld,* we live on a network. From the moment our editors walk in each morning until our disk drives spin down for an evening landing, we meet in the electronic aisles that make up *Macworld*'s AppleTalk link.

Twenty-three people currently inhabit our networked office, including our East Coast Editor 3000 miles away in Boston (see "Who's on the Net"). More than half of these people are heavy network users, generating a steady flow of network mail, corresponding over the network modem, and constantly transferring articles to the file server or spooling them to the LaserWriter. We even find time for an occasional session of *Maze Wars+*.

Although it has taken a while, most of the staff now use the network as freely and as often as they do the telephone. However, getting to this point wasn't easy. Our net construction was filled with twists and turns, the troublesome stuff nobody mentions. Nothing was as simple as the manufacturers would have us believe.

Mail in a Box

After LaserWriter printing, network mail is the service we use most often. In our office, dropping a memo on the seat of an editor's chair gets a quicker response than putting it in the in-box on his or her desk. Surprisingly, the network mail box now ranks on a par with the chair seat for most people. Editors have been known to respond to an electronic memo even before sitting down.

In the year we've had *InterMail* running on a Mac Plus with an AST-4000 hard disk, the program has rarely crashed and has never permanently lost data–a testament to *InterMail*'s design and the AST-4000's durability. In fact the only major problem I've had with *InterMail* was when I plugged my Mac II into the net. So anxious was I to see the dazzling graphics that I completely forgot to check whether the II would run on the network. The problem was, it didn't. In trying to send mail, I discovered the Mac II would sporadically crash as soon as I pulled down the *InterMail* desk accessory.

A quick phone call to Interactive Network Technologies in Massachusetts uncovered the problem. We were running version 1.0 of the *InterMail* software; with the Mac II we would have to upgrade to version 1.35. The InterNet folks were kind enough to rush out an update disk, but nevertheless it was another two days before I could open my mailbox.

Network Tip: New machines invariably require new versions of network software. Before adding Mac SEs or Mac IIs to your network, find out from the manufacturers if new versions of network software are required.

Creaks in the Night

A network is one of those things you never think about until it starts misbehaving. In fact, when it's working smoothly the network is as invisible as it is silent. Our trouble began with a creak.

After running *AppleShare* 1.0 for nine months, the 80MB hard disk on which it ran started rattling. Cars warn owners of impending disaster in the same way, so it was no surprise when the rattle developed into a loud clatter. As you might have guessed, the disk crashed, bringing file service to a halt on the network. It's bad enough when a personal disk drive falters, but when the network file server quits, inconveniences–and the blood pressure of our network manager–multiply, in our case by 23.

Avoiding Network Grief

The answers to the most aggravating network problems can usually be traced to the simplest things. Here's a list of practical tips that will make your day on AppleTalk run a little more smoothly.

- Install Kensington Microware's connector clips on all AppleTalk connectors. You'd be surprised how often a problem is due to a loose connection. We've wasted days tracking down the strangest problems, only to find a loose AppleTalk connector.
- Remember to select both a service and a device using the Chooser. Choose the network service icon from the left side of the window, then choose the appropriate device from the scrollable list.
- Verify your user name in the Chooser. If you recently copied a System file from someone else, be sure to enter your own user name in the Chooser. By leaving the previous user's name in the name field, you may prevent that user from logging on to a network service.
- Check the Caps Lock toggle key. If you've been having problems logging on to a program that's protected by a case-sensitive password, be sure the Caps Lock key is up.
- Pick a consistent user name for all your network applications. For example, if I register myself as "Eileen Drapiza" in an application like *InterMail*. I should not register myself as "Drapiza, Eileen" or as "E. Drapiza" in *AppleShare*. The Mac uses the name you enter in the Chooser to log on to each network service. Consistency makes a big difference.
- Make sure you are running the most current version of the system files. Using different combinations of the System and Finder on one network can wreak havoc. Check with the network administrator for the latest System, Finder, and LaserWriter files. If you must boot from a disk containing an old System file, disable AppleTalk on your workstation (from the Chooser).
- Make sure you've plugged the AppleTalk connector into the printer port. It's easy to mistake the modem and the printer port. If you pick the wrong one, you'll receive a message saying "Your document can't be printed. Make sure AppleTalk is installed and a printer chosen."

–Eileen Drapiza

Our first thought was to restore the file server from the image file we had saved on tape. But as luck or Murphy's Law would have it, no matter what we tried, we couldn't coax the MagNet 85X's built-in tape drive to read the tape. Coincidentally, Eileen, our network manager, had just received *AppleShare* version 1.1. After reading through a list of bug fixes, and living through numerous *AppleShare* crashes, we decided to upgrade.

We ended up reinitializing the hard disk and installing *AppleShare* version 1.1 from scratch. Fortunately we all had backed up our own data from the file server, prompted by flashbacks of the last disk crash.

Network Tip: If possible, test drive a hard-disk file server on a network before you buy it. Try backing up the server and restoring its contents from tape.

Check with the manufacturer if you want to back up an *AppleShare* volume file by file. Several companies offer updates to their backup software that will let you do this. Attempting to restore from a file-by-file backup, however, usually means you lose the access privileges and ownership information from all folders and documents. If you run without a network backup device, remind users that they must back up their own files regularly.

New Life for Fractured Ears

Even though upgrading to *AppleShare* 1.1 had done wonders for our faith in file servers, we (or more specifically Mark, who had to work with the clatter of the file server in the background) still had to contend with the rattle of the disk drive.

Eventually we decided to replace the MagNet 85X with NuData's GigaCell, a 300MB disk and tape drive designed from the start for reliability and heavy network use. The GigaCell is a product that looks and sounds the part of a high-quality machine. But even though the GigaCell is the type of product that instills confidence, it was not without its share of problems.

Having made the decision to swap drives, we daisy-chained the GigaCell to the MagNet 85X, hoping to copy all our files. No luck. Both drives contained SCSI terminators, neither of which were accessible from outside the case. Despite proving her dexterity with needle-nose pliers, and after logging enough hours to launch a second career as a technician, our network manager could not successfully chain the drives. We finally resigned ourselves to reinstalling the file server software from scratch.

Although we were now able to run *AppleShare* from the GigaCell, we still had a problem. The drive contained 300MB of storage, but we could only access 150MB of it. Eric Herzog of NuData explained that our drive actually contained two 150MB drives driven by a single SCSI controller board. The current version of *AppleShare*

software, however, only recognizes one drive per controller. The plot thickened. The solution was for us to upgrade to a single 300MB drive, which NuData agreed to install. The 300MB drive would in turn require a ROM change in the drive's SCSI controller, so that we could start up from the hard disk rather than from a floppy—and the ROM upgrade was not yet available from CDC. Finally, we decided to run *AppleShare* on two 150MB DataCell drives.

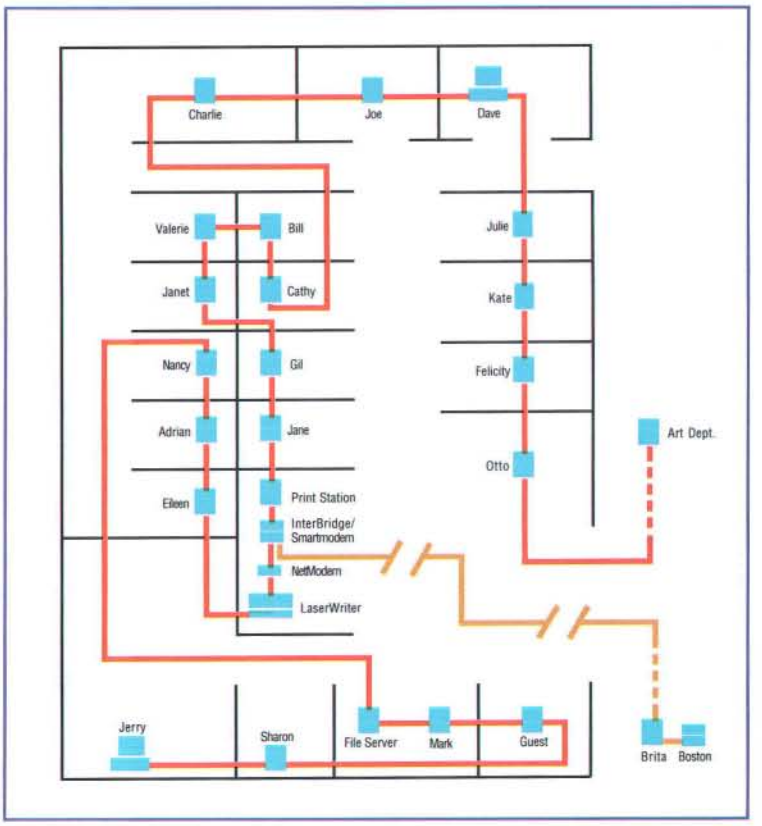
Network Tip: When shopping for a hard disk to use as a file server, look for one designed with reliability and durability in mind. Pay attention to overall construction quality. The mean-time-between-failures figures for a drive often reflect how long a drive will last. Remember that on a network, the drive will be running continuously and will most likely get a heavier workout than a personal disk drive. If you plan to chain drives to the server, find out how easily you can remove the SCSI terminators and change the SCSI address.

My Memo, Your Paper

Everyone prints on the LaserWriter and no one likes waiting. So our decision to install *LaserShare*, Apple's LaserWriter spooler, was a popular one—at first. Although *AppleShare* 1.1 ties up one Mac as the file server, it lets you run a foreground program like *LaserShare* in return. For me this was great, because I had been running Think Technologies' *LaserSpeed* spooler on my Mac Plus. When I switched over to the Mac II, however, the version of *LaserSpeed* I had (1.0) would continually crash. *LaserShare* cured my spooler withdrawal.

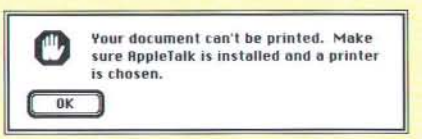
Within an hour after our network manager installed *LaserShare,* a rather heated discussion developed around the printer. Previously, anyone could select Manual Feed from the Print dialog box, start printing, and then race over to the printer and insert letterhead in the feeder. Now if you tried that you might get a letterhead version of someone else's report. Once we discovered (and turned on) *LaserShare*'s Bypass option, users could print directly to the LaserWriter, and things returned to normal.

Network Tip: Allow users to select or bypass network services. Don't assume everyone will do things the same way on the network. Allow for as many variations as possible. One of *AppleShare*'s strengths is that it lets people do things in a variety of ways without dictating how they should use the network.

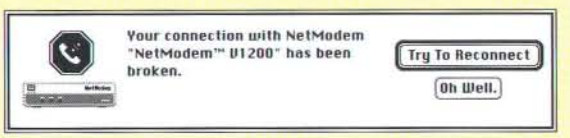


Who's on the Net
Our network connects the Macworld *editors in San Francisco, the art department, and an editor in Boston. Keeping 23 Macs, a LaserWriter Plus, a NetModem, an InterBridge, and an* AppleShare *file server running smoothly has been no easy job for our network administrator.*

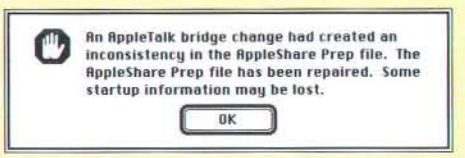
Network Messages We Have Known



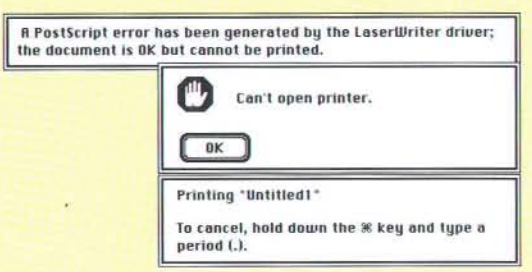
If you accidentally plug the AppleTalk connector into the modem port, you'll get this error message when you try printing.



If you see this one while you're online, it's time to move the NetModem out of reach.



Shortly after installing the InterBridge, our file server crashed. This is the message we got after rebooting the file server.



It took us a day, but we traced this problem to a loose AppleTalk connector. The LaserWriter would appear and disappear from the Chooser's device list. Because we were using custom AppleTalk cabling, the cable was unterminated.

Boston, California

By linking the Boston office to our network in San Francisco, we were able to expand our network services as well as our editorial coverage. But adding a remote bridge to an editor 3000 miles away proved to be as much a lesson in patience as a boon to our productivity.

Although several remote bridge products had been announced, some as long as nine months ago, the Hayes InterBridge was still the only one shipping. Even though the InterBridge has been around for two years and was one of the first AppleTalk devices available, that was no indication of its maturity as a product. In fact, getting it running took more time than I expected and uncovered a few problems.

To start with, most modems advertise themselves as Hayes-compatible, meaning that they implement a majority of the same commands found in Hayes modems. When it comes to connecting the InterBridge to a modem, you should take Hayes-compatibility seriously. I spent the better part of a day trying to get two Novation Professional 2400-baud modems working with the InterBridge—to no avail. When I finally tried two Hayes Smartmodem-2400s, things went much more smoothly.

That's not to say that from then on installation was a breeze. While most of the set-up procedures are straightforward, the most annoying part is having to program the modem by typing a series of cryptic commands. After typing these commands a few times, I got familiar enough with them to recite them in my sleep—nevertheless, having to enter cryptic commands is not Mac-like.

After making numerous voice calls to Boston and repeatedly reprogramming the modem, we finally got the InterBridge working. It was nothing short of amazing when Brita, our East Coast Editor, first printed a document on our LaserWriter. The idea of sending a document to a printer 3000 miles away somehow seems ridiculous, but it opens your eyes to the potential of networks. Shortly thereafter, we got *InterMail* running over the InterBridge with no problems at all. While network mail isn't fast, it's as effective between offices as it is within the office. And even though Hayes doesn't recommend running a file server over a remote bridge, we had no trouble getting *AppleShare* 1.1 running. Other than its sluggish performance at 2400 baud, it's no worse than downloading a file from AppleLink. And from my initial estimates, it's still cheaper—AT&T's daytime long-distance rates to Boston are about $18 per hour versus $25 per hour for *AppleLink*.

While the InterBridge hasn't solved all our communications problems, it sure beats fighting time zones and unreturned phone calls. And although InterBridge's price, $799, inhibits its usefulness as a remote bridge for single Macs, it's a very effective way for two remote networks to communicate. Even at $799, having the remote mail service is by itself worth the price of admission.

The Network Switchboard

Although we now had communications working within our office, we still needed a way to connect our network with the outside world. The solution arrived in the form of a product I had seen demonstrated a few weeks before. Shiva, a company based in Cambridge, Massachusetts, had announced a modem that actually connected to a network rather than to a single Mac. Otto, who downloads our *AppleLink,* MCI, and CompuServe mail daily, understandably couldn't wait to see it. Not surprisingly, we installed the NetModem the day after it arrived.

Somehow it's rather amazing to hear the familiar, albeit scratchy, sounds of a dialing modem emanating from the Mac. The NetModem is one of the most useful network devices I have seen yet. On the other hand, seeing the NetModem in action on the network points out the hazards of sharing devices. For instance, no sooner had Adrian installed the NetModem and successfully dialed up *AppleLink,* than Joe, who also wanted to go online, got a dialog box suggesting that he turn the modem off and back on. After Joe dashed out to see what was wrong, and obediently turned the modem off, Adrian, who had gotten cut off in the midst of downloading a file, got a polite message telling him to try reconnecting.

Network Tip: Shutting off a shared device is sure to result in network chaos.

The Homogenized Networker

In many ways networks are averse to change. Add a new piece of hardware or install new software and the network crashes. Ironically, while the Mac encourages users to experiment with new software, Mac networks demand some degree of conformity. When you plug into a network, you lose the freedom to run whatever system software you please.

Prior to upgrading our file server software and mail software, the network had been increasingly plagued by crashes. Even after installing *AppleShare* 1.1 and upgrading to *InterMail* 1.35, many of us were intermittently finding the dreaded bomb on our screens. After adding NetModem, we knew it was time to make sure everyone was running the same version of the system software.

When it comes to running unreleased software, our editors are the worst offenders. They continually evaluate new versions of released, soon-to-be-released, and even some never-to-be-released applications,

stressing the network to its limit. We push the network and in return we endure our fair share of bombs.

Once we had several network services running, everyone had various versions of the network, not to mention the system software. Our net manager immediately sent out a memo urging everyone to upgrade. The problem was that those who weren't using *InterMail* never got the memo. Because they never received the memo, they never upgraded–it was the network version of the chicken and the egg. After posting a printed notice of the most recent system and network software on our (nonelectronic) bulletin board, our network manager embarked on a tireless crusade against nonconforming software. Shortly thereafter the daily stream of network complaints rapidly dwindled.

Even our most troublesome network holdout was cured after ridding his hard disk of extraneous copies of the *InterMail* server software and upgrading the System and the Finder. It was a sign that we were on the road to network recovery.

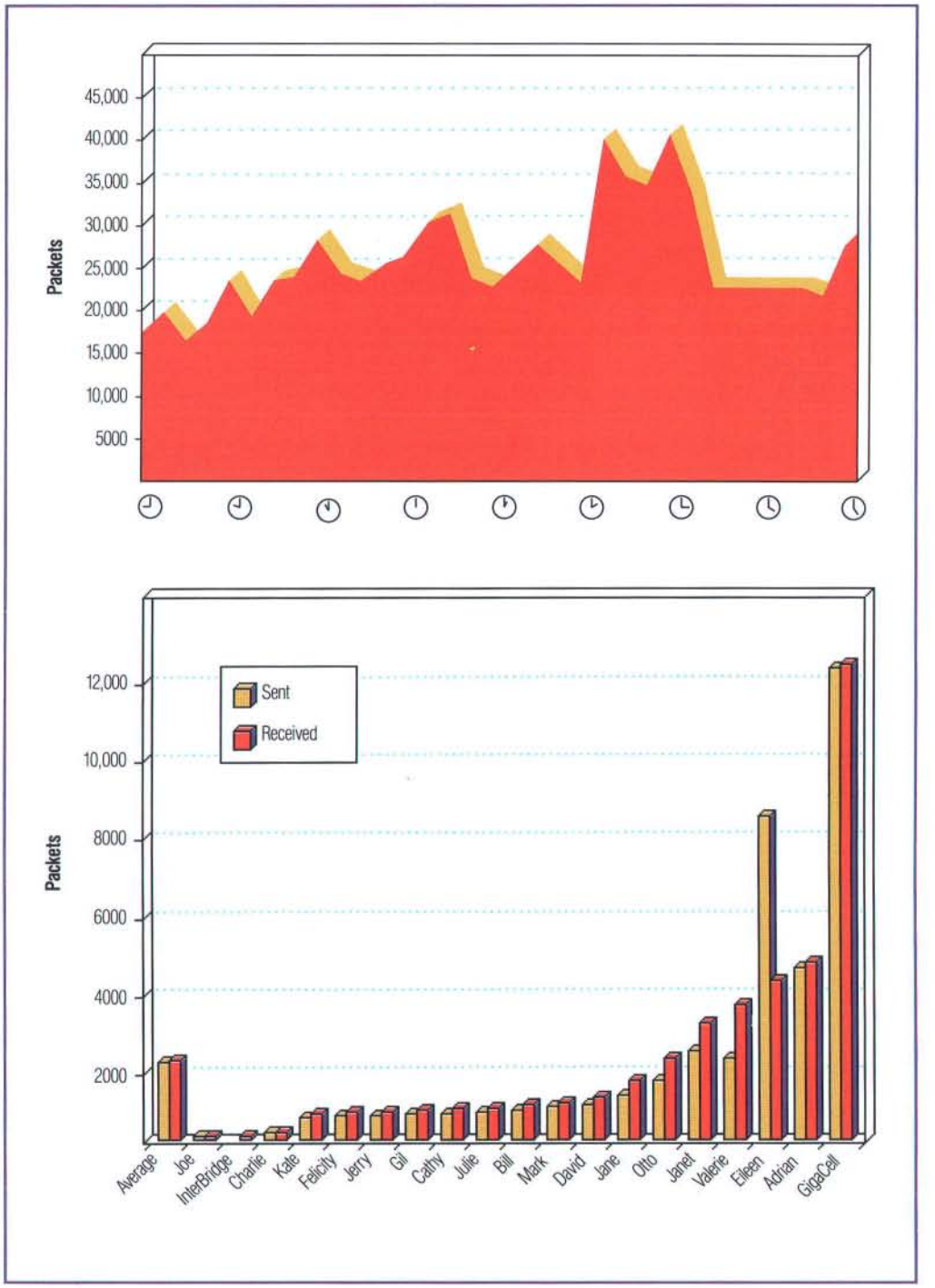
Network Tip: No Mac is alone on a network. Everyone must run compatible versions of the System, the Finder, and the software for any network services. Users who want to run unreleased software should alert the network manager or wait till after hours before bringing the network to its knees.

Well Worth the Wait

It's not all roses in our network garden. We still have our share of problems. And I expect we'll prick our fingers on a thorn or two as we add and evaluate new network products.

Despite the problems we've had, we're still hooked on the network. It's by far the fastest way to connect people and their work. Some days, I send memos on the fly and respond to the network mail almost as fast as it comes in. Whereas a paper memo could languish on my desk for hours or even days, the jingle that accompanies an *InterMail* memo always gets my attention. And besides, sometimes it's as fun to wander through gateways or browse the HyperCard stacks on our file server as it is to dodge an opponent in the maze. Excuse me–a message has just arrived.

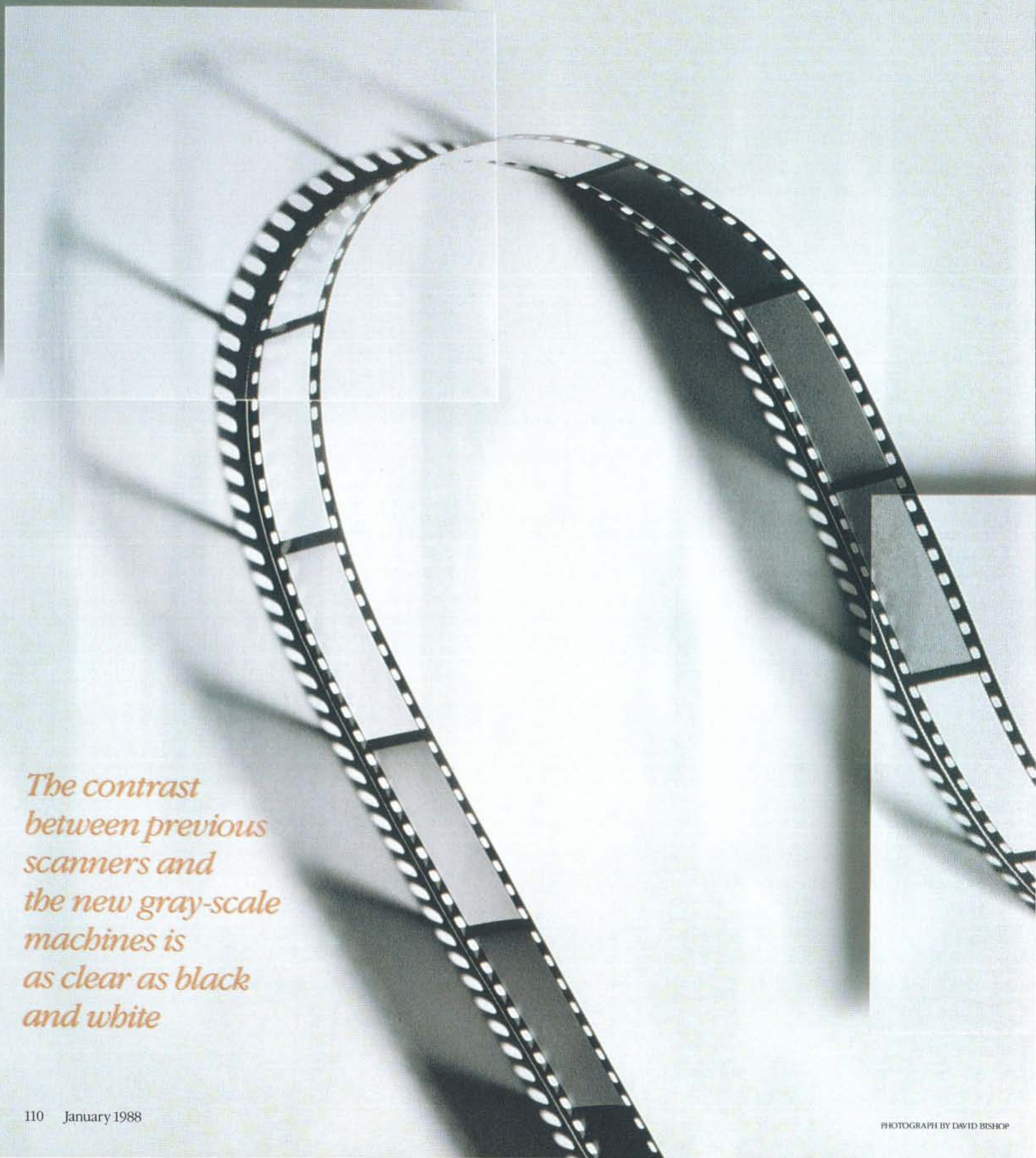
See *Where to Buy* for product details.



Rush Hour

Farallon Computing's Traffic Watch *is essential for monitoring network traffic. In addition to reporting on the total number of packets sent (top), this program helps network managers identify traffic patterns and select locations for setting up bridges that will improve a network's performance.*

Shades of Gray



The contrast between previous scanners and the new gray-scale machines is as clear as black and white

PHOTOGRAPH BY DAVID BISHOP

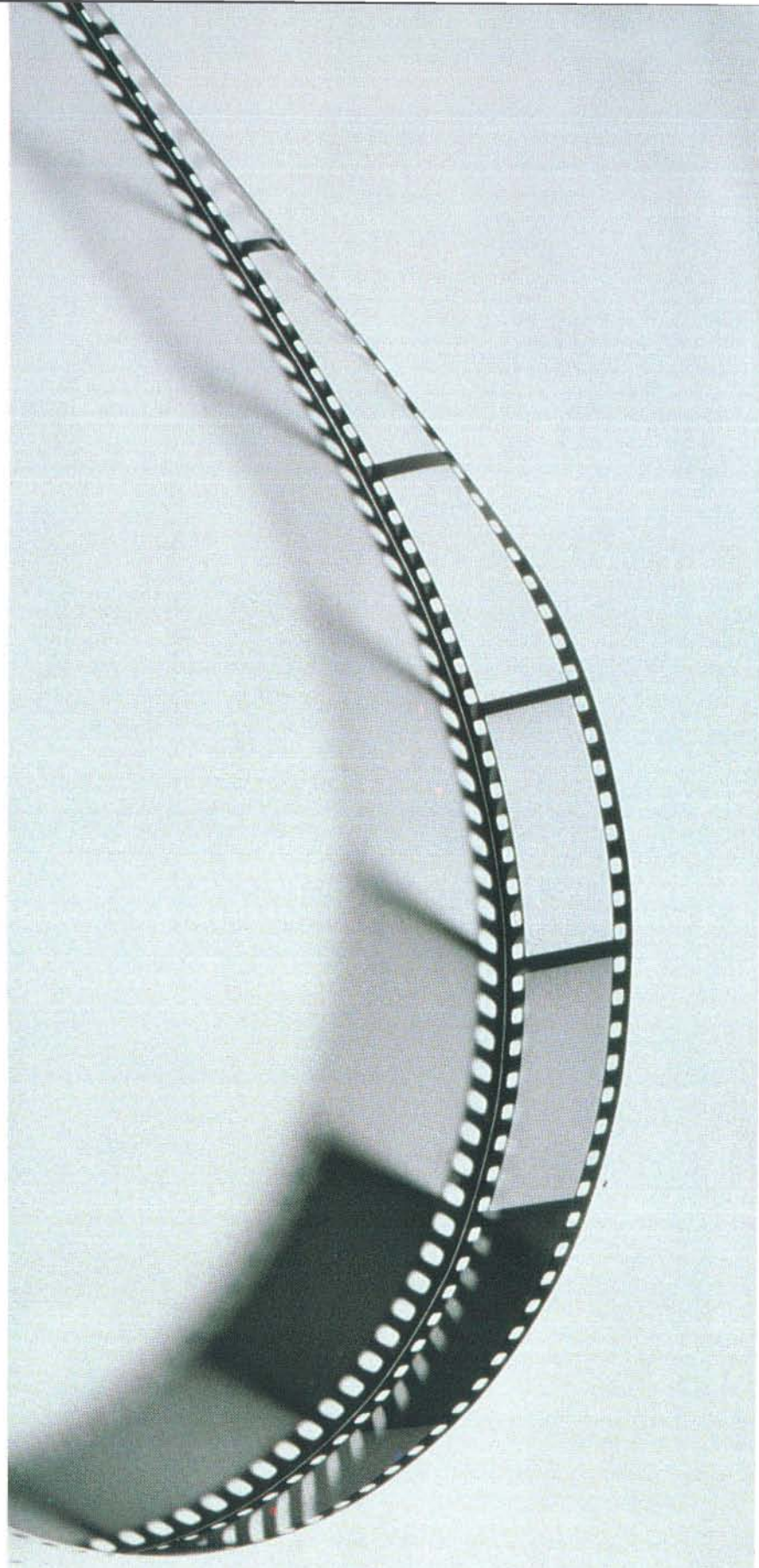
by Jim Morton

Last July *Macworld* published a comparative review of popular scanners available for the Macintosh ("Scanning the Horizon"). The article's conclusion surprised some people: after asking himself which scanner was the one to buy, the author answered that maybe it would be better to wait. It was sound advice. Besides having trouble with software and standards, the scanners we looked at last year (though higher in resolution than the original Mac scanners) could reproduce photographs and other continuous-tone images with only limited success.

Now a new generation of scanners is emerging that will finally make possible the desktop publisher's dream of producing publications that can simply be sent to a phototypesetter with every photograph and piece of art in place. Because these new *gray-scale* or *gray-level* scanners can take advantage of high-resolution output devices like the Linotronic 100 or 300, they can produce halftones that are nearly indistinguishable from those made by conventional graphics cameras. And you can manipulate the gray-scale files these new machines produce in ways previously impossible, changing tonal values or sizing images without rescanning.

With these new capabilities, however, come new complexities. In computer stores around the country right now, anyone looking for scanners is liable to hear that a particular model "saves 8 bits per pixel for a total of 256 gray levels at 300 lines per inch, supports TIFF and EPSF, and offers built-in gamma correction and a user-definable dither matrix."

Sounds good, but what does it mean? To choose the right scanner today—and to get the results you want from it—you'll find it helpful to understand a few things about halftones generally, about the basic principles of halftoning with a computer, and about how the new gray-scale scanners differ from the previous *bi-level* machines. Even if you use an old scanner, having a grasp of how your machine works will give you more control over your output.



Halftoning

Black-and-white photographs contain hundreds of gray tones. Because printing presses generally print these images with only one color (black), printers must use a process known as halftoning to reproduce a full range of grays. Halftones, which printers make by reshooting continuous-tone art through special screens, are composed of variously sized dots that simulate gray values. Although dots in a given picture are of different sizes, their frequency is constant; this frequency is known as a halftone's *screen ruling* and is measured in lines per inch (lpi).

Newspapers commonly use halftones with a screen ruling of 85, which means newspaper photos contain 85 lines, or rows, of dots per inch. A 100-line screen is typical of good-quality newsletters or low-



Connecting the Dots *The number of printer dots in the dither matrix defines the halftone dot's resolution (and the number of gray levels possible). The matrix style affects the image's appearance. These three patterns all represent 50 percent dots. The leftmost is a spiral pattern, the next is a star. The 8 × 8 matrix forms the truest dot.*

budget books. Quality books and magazines (like this one) commonly use 133- to 150-line screens.

Halftones are generally produced in one of two ways. The inexpensive way is the *photomechanical transfer,* or PMT, which is printed on paper and simply pasted up along with the text on printing flats. The practical resolution limit for this technique is 100 lpi; any finer and the dots bleed together or disappear when your printer makes printing negatives from your flats. A more expensive technique skips the pasteup step and goes directly to negatives. This method produces up to a 150-line screen, though not all print shops can handle that fine a screen.

In the world of traditional, analog halftones, resolution–expressed as screen ruling–is the main index of image quality. One reason there's currently so much confusion about scanning is that in the digital world, image quality is the result of an equation with two main variables: knowing the resolution of a scanner isn't enough, you also have to know how many gray levels it produces.

The main concept to remember in Mac scanning is that as the number of gray levels goes up, resolution goes down, and vice versa; achieving the best results is always a matter of finding the optimum mix of both. For example, a 300-dots-per-inch (dpi) bi-level scanner could produce a halftone with a resolution of 150 lpi–but the image will look very crude because it will contain a maximum of 5 tonal values, including black and white. The same machine can produce an image with 26 different tones, but the resolution will be only 60 lpi. This trade-off is a result of the manner in which computers produce the different-size dots that make up a halftone.



Truvel's unique 8-bit TZ-3 is essentially a flatbed scanner turned upside down. Lights and a lens move above the copy stand, scanning books or flat media.

Dithering Around

Unlike photographic processes, which produce halftone dots in a virtually infinite number of sizes, printers like the LaserWriter or the Linotronic machines always print the same size dots. This means the dots you see in a Mac halftone are actually clusters of much smaller dots. (Since there seem to be no standard terms, for the purpose of this article the larger, visible dots will be *halftone dots,* and the smaller, 300- to 2540-dpi dots will be *printer dots.*)

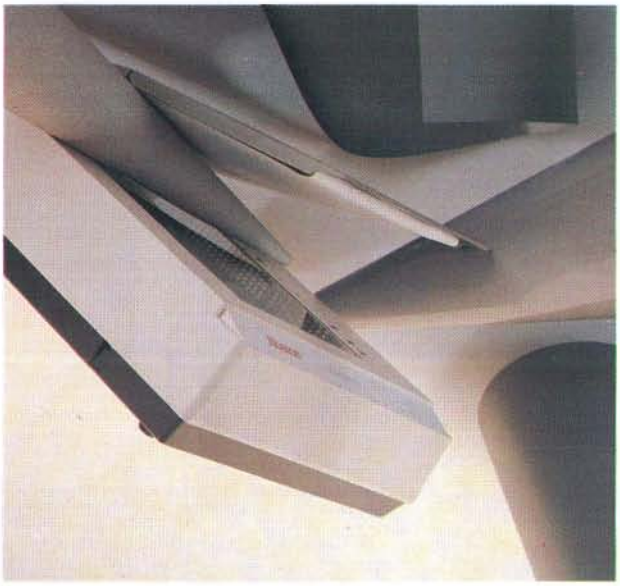
If you use a 300-dpi printer to create a 60-line halftone, your scanner software divides the images into halftone dots that are 5 × 5 (5 across by 5 down) printer dots in size (300 dpi ÷ 60 lpi = 5). Given this 25-printer dot *dither matrix* (see "Connecting the Dots"), you can make halftone dots of only 25 different sizes. This is why, if you include white (no dot), you get 26 tonal values at 60 lpi on a LaserWriter.

The larger the dither matrix, the more dot sizes the printer can make and the more tonal values it can represent. On the other hand, a larger dither matrix means larger halftone dots–and lower resolution.

The process of creating specific screen percentages using several printer dots to form each halftone dot is called *dithering.* Turning on 50 percent of the dots in a dither matrix produces a 50 percent gray value. The order in which the software turns on printer dots on the way from white to black is also important. Different algorithms for figuring out which dots should be black for a given percentage produce different patterns and effects.

Of course, the way around the problem of trading resolution for gray levels is to use smaller dots. At the Linotronic 100's 1270 dpi, an 8 × 8 matrix (which produces 64 gray levels, the minimum for a reasonably natural look) takes up only 1/150 inch, providing a 150-lpi halftone. This is where one of the main advantages of gray-scale scanners comes in. When bi-level scanners digitize a photograph, they save the image as a *MacPaint*-like bit map. The scanning software establishes the dither matrix and assigns which printer dots

PHOTOGRAPHS BY FRED STIMSON



Abaton offers a gray-scale scanner only in this 4-bit flatbed design.

will be on or off. Sending a bi-level file to a Linotronic typesetter won't improve its resolution; in fact, since neither 2540 nor 1270 can be evenly divided by 300 (the sampling rate of high-resolution bit-map scanners), sending a bi-level file to a phototypesetter may result in distortion and an ugly crosshatched pattern.

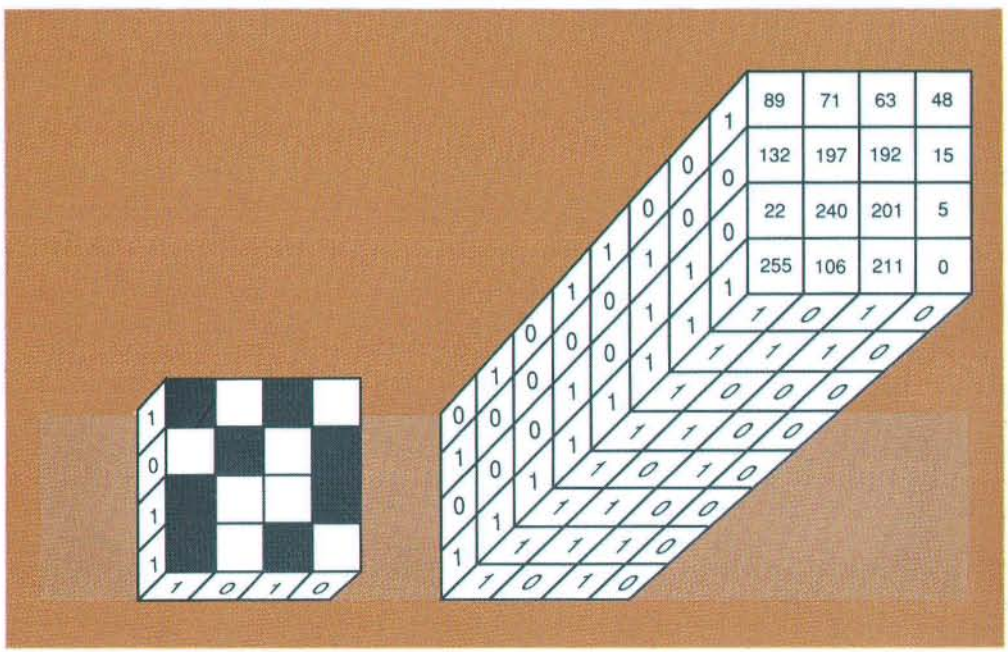
On the other hand, gray-scale scanners are to bi-level scanners as *Illustrator* is to *MacPaint*. Gray-scale scanners are *device independent,* which means they leave the decision of exactly which printer dots will be on or off up to the printer—which also means these scanners can take advantage of higher-resolution devices to make better-looking halftones.

Into the Gray Area

If you look at the illustration in "Bit Maps in Depth," you'll see that gray-scale scanners also produce bit maps, but their bit maps are "deeper." Think of the cells in the illustrations as samples made by a scanner at 300 samples per inch. For each sample a bi-level scanner takes, it registers a binary value: on or off. When the software saves the file, it looks at how many printer dots in a dither matrix should be on or off and then assembles a halftone dot of an appropriate size.

As the illustration shows, the gray-scale scanner registers far more information about each sample. The gray-scale scanner that made the samples in the illustration is an 8-bit scanner, which means that for every sample it can store an 8-place binary number corresponding to one of 256 gray values ($2^8 = 256$). The other common caliber of Mac gray-level scanner is the 4-bit scanner, which has the ability to assign a given sample to one of 16 gray levels ($2^4 = 16$).

When you save a gray-scale file, you set the screen ruling you want for output. The processor in the printer then looks at the saved information and de-



Bit Maps in Depth

You can think of bit maps from a gray-scale device as being "deeper" than bi-level ones. Bi-level scanners register that a sample is either on (black) or off (white). By contrast, the gray-level machines store 8 bits of information for every sample, meaning they can register 256 binary values (2^8). When the gray-scale file is printed, the output device interprets the gray-scale information and approximates the original tones.

Examining Scanners

Manufacturer/Scanner	Feed system	Bits per pixel	Gray levels	Samples/inch	SCSI	Adjust contrast	Adjust brightness
New Image Technology							
Magic	video	8	256	300		●	●
MacScan	sheetfed	1	b&w	75-300	●		[2]
MacScan FB	flatbed	1	b&w	75-300	●		[2]
MacScan Plus upgrade kit[3]	n/a	8	256	75-300	●	●	●
Datacopy							
Jet Reader	sheetfed	4	16	150-300	●		[2]
Model 730	flatbed	4	16	150-300	●		[2]
Model 840[3]	flatbed	8	256	150-300	●	●	●
Microtek							
MS-300A	sheetfed	1	b&w	75-300	●	[2]	[2]
MS-300C	sheetfed	1	b&w	75-300	●	[2]	[2]
MSF-300C	flatbed	1	b&w	75-300	●	[2]	[2]
MSF-300G[3]	flatbed	8	256	75-300	●	●	●
Dest							
PC Scan	sheetfed	1	b&w	200-300	●		[2]
PC Scan+	sheetfed	1	b&w	200-300	●		[2]
PC Scan 1000[3]	sheetfed	4	16	38-300	●	●	●
PC Scan 2000[3]	sheetfed	8	256	38-300	●	●	●
Abaton							
Scan300 w/C-Scan 1.5	sheetfed	1	b&w	75-300		[2]	[2]
Scan300/FB w/C-Scan 1.6	flatbed	4	16	75-300	●	●	●
Comtrex							
Imagizer	video	8	256	640[4]	●	●	●
Pixelogic							
ProViz	video	4	16	640[4]	●	●	●
Hewlett-Packard							
ScanJet[3]	flatbed	4	16	75, 300	●	[2]	[2]
ThunderWare							
ThunderScan	ImageWriter	5	16	19-300		●	●
AST Research							
AST Turboscan SF	sheetfed	1	b&w	75-300		[2]	[2]
AST Turboscan FB	flatbed	1	b&w	75-300		[2]	[2]
Truvel							
TZ-3	scanning table	8	256	75-900	●	[2]	[2]

[1] These parameters can be changed by typing PostScript commands in the editing window.
[2] Set before scanning.
[3] Prerelease information; prices and specifications subject to change.
[4] Horizontal samples.
[5] File size is constant and small.
[6] Scan adjusted for reprinting.

cides how many gray levels the printer can deliver, given that screen ruling. Thus an 8-bit file at a 150-line screen printed on a LaserWriter will have 4 gray levels ([300 ÷ 150]²); printing the same file on a 1270-dpi Linotronic 100 yields 72 possible gray levels ([1270 ÷ 150]²); while a 2540-dpi Linotronic 300 will give you more than 256 gray levels (the scanner's maximum).

The other great advantage of gray-scale files is that all the information they record per sample gives them the potential to be manipulated (via new image-processing software such as *ImageStudio*) far beyond the capabilities of bi-level bit maps (see *Reviews, Macworld,* December 1987). *ImageStudio* does have the ability to reconstruct a gray-scale file from the information in a bi-level scan. However, the results of this process are not as satisfactory as starting with gray-scale information.

To give credit where it's due, gray-scale scanning on the Macintosh is not really new: ThunderScan has always captured gray-level information. You could use this information to perform sophisticated contrast and brightness editing from within ThunderScan's software, but once you printed the file, saved it to disk, or sent it to a page-layout program, the gray-level information was lost and the file looked no better than output from other scanners.

TIFF	EPSF	Gray-map filter	Halftone screen/ angle control	Scan to disk	Gamma correction	Line-art setting	Price
•	•		1				$549
•	•		1			•	$1547
•	•		1			•	$1899
•	•		1			•	$300
•	•		2 patterns	•		•	$1300
•	•		2 patterns	•		•	$1800
•	•	•	•	•	•	•	$8995
•	•		12 patterns	•		•	$2495
•	•		8 patterns	•		•	$1695
•	•		8 patterns	•		•	$1895
•	•			•		•	$3000-$4000
•	•			•		•	$1995
•	•			•		•	$2495
•	•			•	•	•	unknown
•	•			•	•	•	unknown
•	•		2 patterns	•		•	$1895
•	•			•		•	$2295
•	•		1	n/a[5]	6		$1995
•	•		•	n/a[5]			$1595
•				•		•	$1995
•	•	•				•	$229
•			15 patterns	•		•	$1699
•			15 patterns	•		•	$1899
•					•	•	$5095

Gamma Correction

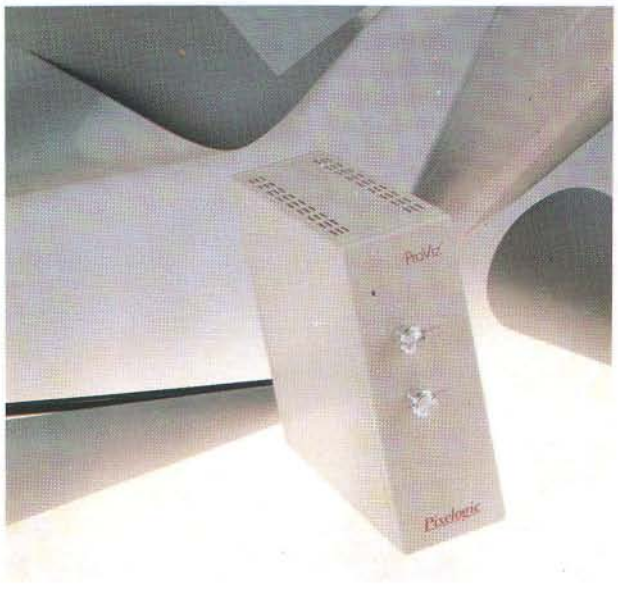
A new catch phrase you are apt to hear when purchasing a scanner is *gamma correction*. Gamma correction is like kerning in page-layout programs: a useful feature that we all managed to live without until we learned what it meant.

Although a scanner may save 8-bit gray maps, that doesn't necessarily mean that you will get 256 levels of gray out of it. Part of the problem is that some scanners save gray-scale information on a straight one-to-one basis. In the real world, the amount of information needed to accurately interpret a dark gray area is greater than the amount of information needed to interpret a light gray area. To solve this problem, some scanners save the information on a curve, so that the amount of data stored at each gray level is skewed toward the dark end of the scale. This is gamma correction.

Cutting Corners

Since gray-scale scanners save 4 to 8 bits of information where bi-level scanners saved only 1, files can grow ridiculously large in no time. A bi-level scan that takes 70K may grow to 4 megabytes when saved as an 8-bit gray map. If you try to print such a file on a Linotronic, you'll wind up mortgaging your home to pay the typesetter (see "At the Service Center").

The situation, however, is not as bad as it sounds. There are ways to decrease file size and still get the desired results. Besides TIFF (Tagged-Image File Format) storage, the single most important feature of a gray-level scanner is the ability to alter the sample rate of the scan. If you are printing a halftone with a 100-line



Video digitizers, such as this 4-bit Pixelogic Pro Viz, don't use a CCD like other Mac scanners. Instead they produce digital images from video signals.

screen, no matter what device you print on, you will get only one halftone dot for every 1/100 inch. If you scan at 300 dpi, you'll save nine samples for that one dot–a waste. Most nonvideo scanners offer a variety of scanning rates. When printed, the difference in quality between a 100-dpi gray-scale scan and a 300-dpi gray-scale scan is negligible, but the time it takes to print may vary drastically.

Another way to approach this problem is to use *ImageStudio*. Whatever the magnitude of the original file, *ImageStudio* gives you the ability to cut it down to size either by precropping it or by reducing the resolution. A document sampled at 300 dpi that is opened in *ImageStudio* at a 50 percent resolution, and then saved, will have a resolution of 150 dpi.

Most video digitizers do not offer adjustable sample rates because their available image is based on the size of the video frame, which is constant. To make up for this limitation, video digitizers offer a lot of information in a little space. Comtrex's Imagizer, for instance, creates an 8-bit gray-map file that is only 204K. On the minus side, video images are always the same size. When enlarged past the original scanning parameters, they often look ragged and unacceptable. Figure about a half-page as the practical limit for good results with these machines.

It's Caveat Time Again

Gray-level scanners offer power never before available with personal computers. But that power has a price. And, as with most things, the real price can be hidden by hype. The image-processing that gray-scale scanners make possible is a sophisticated application. To do it properly, you'll want sophisticated gear. The true cost of getting the halftones you want will probably not be limited to the initial scanner price.

For example, once you've made your scan, you need software to do something with it. Final marketing decisions for many of the gray-scale scanners we looked at had not been made when this article went to press. Abaton was shipping its Scan 300/FB, however, and the base price did not include software. To actually operate your machine, you have to buy a program.

Tip: SCSI Compatibility

The Mac can accept up to seven hard disks, scanners, or other machines daisy-chained to the SCSI port, but they all must have different device numbers. Scanner and hard disk manufacturers set each machine to a certain number before they ship. If your Mac won't start up when you install your new scanner, it may be because the scanner has the same device number as your hard disk.

On some scanners and hard disks, the device number is easily changed with a DIP switch located on the back or inside the machine. On others, changing the device number requires special jumper wires and a trip to the computer store. Before you buy any SCSI device, find out what is involved in changing its device number. Make sure that the scanner and your hard disk have different numbers or that you can change the numbers yourself.



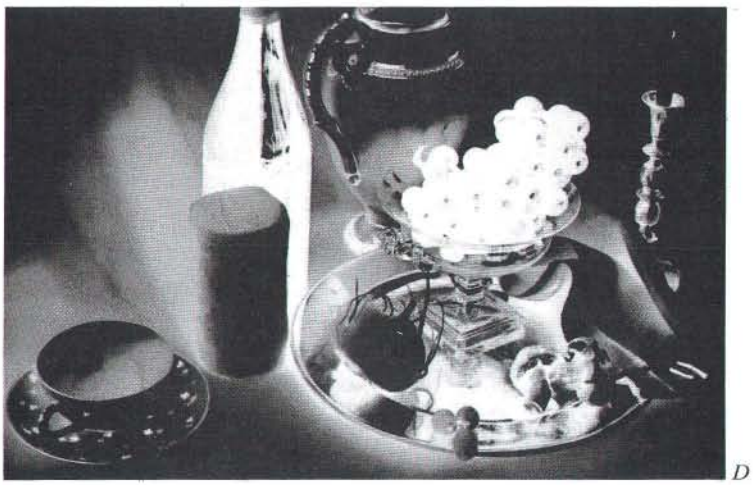
A



B



C



D



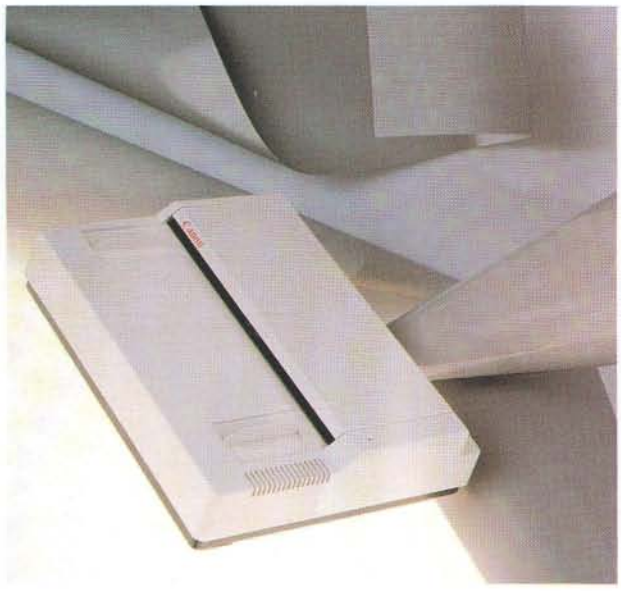
E



F

Six Scans

Different treatments of the same photograph: (A) was made with an 8-bit Datacopy scanner and printed on paper at 100 lpi by a Linotronic 300. (B) was produced with a 4-bit Abaton gray-scale machine and output by the same method as (A). Notice the pronounced banding. (C) is a conventional 100-lpi PMT. (D), the pick of the litter, was made from the same Datacopy file as (A) but was printed directly to negative at 150 lpi. This negative took a Lino 300 only 25 minutes to print. Both (E) and (F) are 50-lpi LaserWriter printouts. (E) was made from the same 4-bit file as (B); (F) is a bi-level file made by the New Image MacScan. The bi-level file looks somewhat better because it shows 36 gray levels, as opposed to the gray-scale machine's upper limit of 16 (note that most gray-scale machines offer a bi-level option for optimizing laser printouts).



New Image's MacScan interfaces enable you to use this Canon sheetfed scanner with a Mac. MacScan comes in bi-level and 8-bit models.

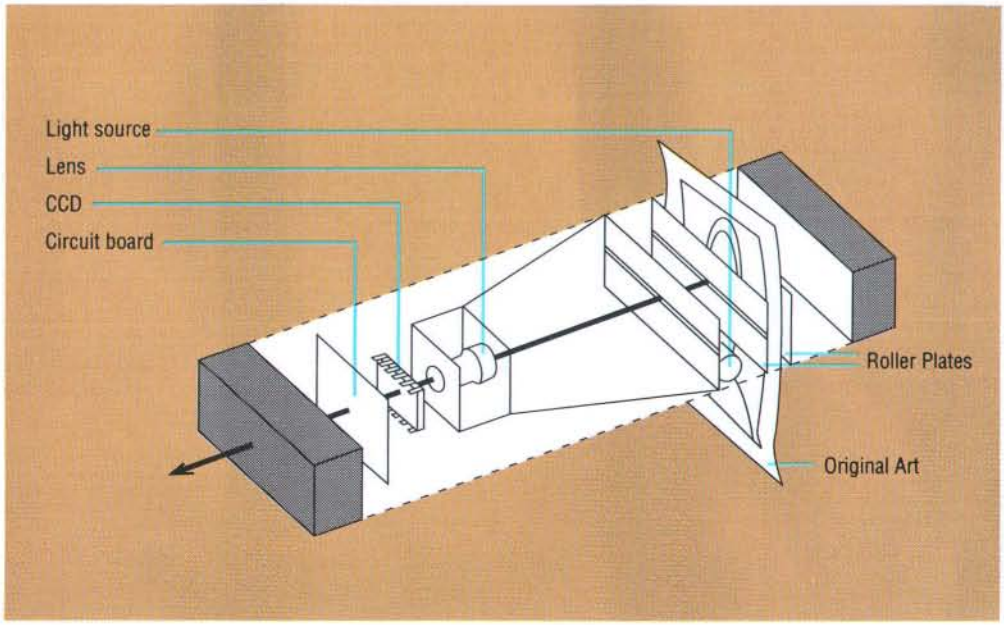
And to top it off, although Abaton offers various software options at various prices, none of these programs can open and edit a gray-scale file.

For that purpose, Abaton recommends *ImageStudio,* at a price in the $500 neighborhood. By virtue of being first, *ImageStudio* seems to have become the de facto standard for image-processing software. There are, however, other programs now entering or about to enter the market that rival *ImageStudio*'s abilities. Whatever scanner you buy, gray-scale editing and image-processing capability is something you'll want. With gray-scale software you can control the contrast of scans in tiny increments, remove blemishes and extraneous objects from pictures, adjust the halftone screen ruling, eliminate wasted file space, achieve interesting effects, and generally have a lot of fun.

For sheer control over digitized images, no program I've seen so far can match Datacopy's MacImage software version 2.0, which the company says it will ship with its $9000 Model 840 8-bit scanner. This amazing program does not offer *ImageStudio*'s pixel editing tools, but it lets you design your own gamma curves and dither-matrix patterns either by using tools in the program or by importing formula tables from *Microsoft Excel.* Of course at that price, the software had better be great.

The computer you'll be using may also determine whether, or how far, you want to plunge into the world of gray-scale art. When you open an 8-bit image file containing 256 shades of gray on a Mac Plus, what you see isn't even close to what you get. This can be a big problem when you're trying to edit images or alter the gray map. For the full effect, you'll need a Mac II and an 8-bit video card with an analog monitor–either color or black-and-white.

Since gray-scale scans can take up huge amounts of storage–not to mention the disk space required for image-processing software–don't even think about this stuff unless a hard disk is in your budget. And having enough RAM is equally important. If your scanner scans to disk, you may wind up with a file too big to



Inside a Scanner
The heart of most scanners is the charge-coupled device (CCD), which contains sensors that register light intensity. In this exploded view of a sheetfed scanner, a lens reads the artwork through a slot as the copy passes between rollers. The lens then focuses the light on the CCD.

At the Service Center

Printing out bit-mapped images on a Linotronic phototypesetter has never been fun. A bi-level bit map of a photo might take up to an hour to print, but you can measure the time it takes to print a 6MB, 8-bit gray-mapped image with a calendar. At $8 an hour plus $7.50 a sheet for phototypesetting, versus $7.50 for a photostat, the choice is obvious. The only time it becomes cost-effective to send digitized images to a phototypesetter is when they are combined with text in complete page layouts. Even then, only images with gray-level information are worth reproducing this way.

The clock starts ticking once you enter the service center and register, so make sure you waste no time getting your files printed. Whenever possible, print a copy on a laser printer first. Check it over thoroughly before sending the file to the typesetter. Images that have been cropped or resized in a page-layout program take longer to print. If a picture needs cropping, do it by saving the selected portion directly from the scanner software, or by using *ImageStudio*. The same goes for resizing. Ideally, you shouldn't make any alterations to an image once it has been placed in a page-layout document.

The best way to keep service time short is by keeping scanner files as small as possible (see the advice under the heading "Cutting Corners" in the main article). The new scanner technology can save you money, but only if you use it wisely. That means planning your scans before you make them.

call up for editing or printing. You'll want a minimum of 1MB. (*ImageStudio*'s options for reducing the resolution of a scan and opening only part of it can be helpful in this respect.)

Other hidden costs can include cables and SCSI terminators, which don't come with some scanners. Additional cables can add over $100 to your package. A SCSI terminator is a small extension plug that looks like it should cost $2.95 but actually costs about $40.

So, before buying any scanner, ask for a demonstration–if possible on a system that closely matches your own. Ask the salesperson to bring an image up on the screen and make contrast and brightness adjustments to it; this level of editing is an absolute minimum for useful operation. Find out if the software you need to make contrast and brightness changes is included in the price of the scanner. And ask about cables and terminators.

It's all right to be a pest. Next to your computer, a scanner is probably the most expensive device you'll buy. A few hours of caution will save you from regrets later.

The Right Scanner

The right scanner for you depends on what you'll be doing and how much you want to spend. A scanner that saves files in TIFF is a requirement for anyone using scanned images with page-layout programs. Publishers or graphic artists who want a device that can produce PMT-quality results will need a scanner that saves at least 6 bits per sample (64 gray tones); at less than 6 bits you begin to notice banding between gray tones.

If you plan to print your scans only on a LaserWriter, you won't make any resolution or gray-level gains by moving to a gray-scale scanner; bi-level or gray-scale, the best you can get on a 300-dpi printer is 16 gray levels and 75 lpi. That's not to say that you won't benefit from having a gray-scale machine. The ability to change the appearance of an image without rescanning is a feature that can save anyone time and money.

Of course, other considerations besides the number of bits per pixel a scanner saves will influence your decision about which machine is right for you. "Scanning the Horizon" (July 1986) includes a good discussion of the other factors–such as character recognition capability or the flatbed versus sheetfed issue–that should enter into your decision. □

See *Where to Buy* for product details.



MICK WIGGINS

HELP!

Where do you turn when your programs have problems?

by Michael Alexander

You bought a hot new $395 word processing program last month, and it's got every feature in the book. Unfortunately your programming wonder won't print correctly with your $5000 LaserWriter. The word processor's instruction book reads as if it were translated from a foreign language, so you phone your dealer. Your salesman, who said he wanted a long-term business relationship ("Just call any time you need help..."), quit last week. His replacement tries to sell you a Mac II.

Since the problem could be in the printer, you call Apple, long-distance. A voice there explains that all support is given through dealers.

Well, maybe the problem is with the word processor—your other programs print. You call the software publisher's customer support number, long-distance. After all, you're a customer and you need support. You get a busy signal for the first five tries and then, when you finally connect, a recorded voice tells you to call Technical Support. After several tries, you're put on hold. You use the 20-minute wait to browse through back issues of your computer magazines for a vaguely remembered mention of your problem. Can't find it.

When a technical support representative comes on the line, you explain the difficulty. "Oh, yeah," she says knowingly. "It's a glitch in the LaserWriter. You'll have to call Apple." Then she reminds you that the support service that came with your software expires next month. If you want continued help, you should sign up now for just $75 a year. Next month, the same coverage will be $99.95.

Have a nice day.

Help Headaches

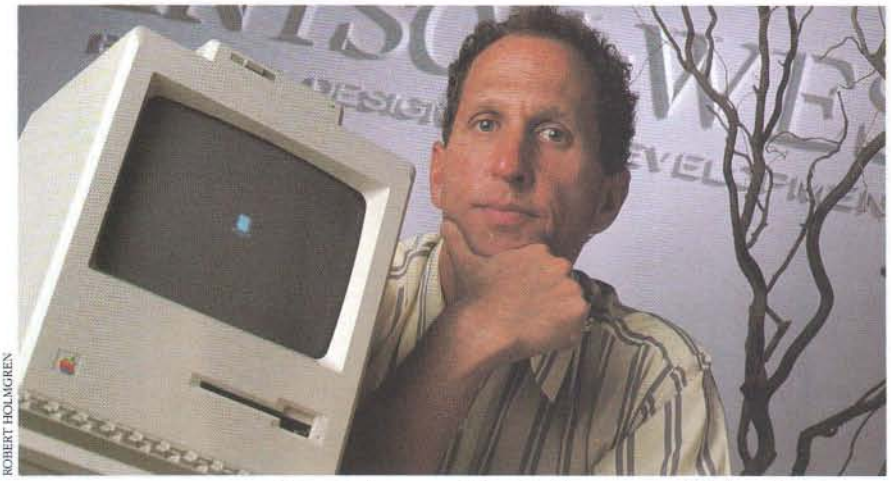
When the Mac first came out, *MacWrite* and *MacPaint* were revolutions in user-friendliness. Both programs were easy to learn, and they worked. If you were a complete klutz, your dealer explained how to change the ruler settings. Enthusiastic industry pundits predicted computers would soon become so intuitive that documentation and software support would be unnecessary. Macintosh TV ads showed a 10-pound stack of IBM manuals crashing like bricks onto a desk, followed by the soft plop of a slim Mac manual.

Today you could flatten your mouse trying a similar stunt with Mac documentation. Some of today's Mac programs come with two- or three-volume instruction manuals, not to mention the tapes, videos, and training courses. Today's Mac is more complex, the Mac marketplace is more crowded, there's more hardware and software and more features. The Mac's success has many users pleading for help, and some are having a hard time getting it.

One reason good help is hard to find involves the dealers, who are the major support channel for most people. A recent *Macworld* survey showed that more than 40 percent of readers are dissatisfied with their dealer service. It's disillusioning to discover that the person who sold you your hardware doesn't know anything about writing macros in *Excel*.

The reasons for such ignorance are no mystery. The commission for selling a $400 spreadsheet program is a fraction of that for a $5000 Mac II, and since the amount of sales and support time can be the same, guess where the effort goes? For their part, dealers say customers' expectations are unrealistic. "I have 200 pieces of software on the shelves," says Ken Petracek, manager of the computer division of CW Electronics in Denver, "but people find it frustrating that I don't know every program in depth."

Then there's customer Ping-Pong. It happened to Terry Shelton, operations manager of a San Francisco



ROBERT HOLMGREN

HyperDrive owner Terry Shelton (now on his fourth drive) calls GCC's support nonexistent. Although he has a service contract, he has never received notice about upgrades to make the drives work with new Apple Systems.

wholesaling firm. When Shelton called General Computer about his HyperDrive hard disk, GCC told him to call his dealer (Ping!), who knew nothing (Pong!). So Terry called GCC back and sat on hold "forever." All he wanted to know was whether there was a new version of HyperDrive's system software, since his version was crashing with Apple's newest System. (There was a new version, but GCC hadn't notified its customers.) Now Shelton is broadcasting his plea for help–and his strong feelings about GCC's service–on user-group bulletin boards.

Another trend that's raising the frustration level of many users is the increasing tendency of publishers to shift the burden of software support to customers. To cut costs, many publishers are quietly converting toll-free phones to regular lines. Others are raising software prices. Borland, for example, raised the price of the new release of its *Reflex* relational database manager. It did so partly because of the upgrade's new features and partly because the average call for help lasts 20 minutes, and Borland picks up the tab.

Of course, another solution to the rising cost of help lines is simply not to increase support staffs to meet the growing number of calls, which leaves irritated customers on half-hour long-distance holds.

But the most controversial trend on the software help scene is the tendency of companies to limit the help customers get with a software purchase; after an initial period of free support, the customer is charged for services rendered. Pay services are particularly favored for very specialized programs, such as high-end accounting packages, and by big software companies that sell complex programs to corporate customers. Ashton-Tate's plan is typical. You get 90 days of unlimited (but not toll-free) help calls. After that, you choose among three contracts costing from $50 to $150 a year for a limited number of calls ($150 buys you a contract that includes 20 calls and a package of publications). Contracts for corporations can cost up to $995. As the Mac goes increasingly corporate, expect more service of this type.

Manual Labor

Then there are the instruction manuals or, as they're known in techno-jargon, *documentation.* Many talk gibberish. Can you understand the instructions on how to create style sheets in *Microsoft Word* 3.0? Can you decipher runes?

Other manuals talk down. The 185-page instruction book for *MicroPhone,* a relatively easy-to-use communications program, begins by assuming you know how to work a Mac. Forty-six pages later, it still explains dialog-box choices like this: "Move the mouse pointer over the round button labeled with the Baud rate you wish to change to. Click the mouse button and the on-screen button that you have chosen will highlight." In other words, click on the baud rate you want. After wading through the manual, written in 1985, you can check the addendum, written in June 1987, to find what has changed in the procedure you just learned. Then you can check the Read Me First! document on *MicroPhone*'s disk for last-minute alterations to the changes.

Perhaps that illustrates the central problem of the help conundrum–there's no central source. You ricochet from manual to dealer to publisher, frustrated and angry as you fritter away the time that computers are



supposed to save. And even if you do find your answer quickly 80 or 90 percent of the time, the bad experiences are the ones you remember.

Corporate Solution

Some large companies have recognized the inefficiency of individual employees' calling software publishers or dealers for help. One such company, Seattle's Seafirst Bank, set up an information system that offers the users of its 2600 Macs a variety of help options.

Seafirst employees receive basic computer training and courses on software programs from an information center officially called Professional Electronic Tools but nicknamed The Pet Shop. For phone help, workers can call a help line staffed by 13 specialists

who handle a staggering 500 calls a day–11,000 per month. Face-to-face assistance with complex problems comes from a small group of experts at the resource center.

But Seafirst's innovation is 130 employees who, in addition to their regular jobs, act as "paratrainers." Diane Wood took an introductory paratrainer class at the Pet Shop, followed by courses in specific Mac programs. Now she helps all the computer users on her floor. Fellow paratrainer Gail Gautestad observes that the paratrainers are effective partly because "we're still basically end users–not high-techies."

Some corporations buy training-and-support contracts from the dealers or consultants who supply them with hardware and software. Training programs, which cost from $150 to $350 per day for each employee, can be a very lucrative sideline for their providers. Students, however, sometimes complain that the courses are little more than walk-throughs of the training manual.

Another solution for corporations is third-party help. A San Francisco firm called Computer Hand Holding supports the Mac's top ten business products. According to president Emil Flock, the firm seeks business primarily from medium-size and large corporations that need high-volume help, don't want to staff a support department, or need to ease demands on their own information centers.

What does such service cost? A typical one-year contract provides 40 hours a week of telephone help, administration, and reporting for $2500 a month. Additional time is $50 an hour.

Getting What You Need

Even if you don't have an information center to draw upon, help could be closer than you think. In addition to checking the manual or calling the help line, consider the following often-overlooked resources.

- It may seem obvious, but since you're already at your Macintosh, check your program's help screens. Sometimes they're clearer and better organized than the printed manuals. Some may even have more information: Apple says the on-screen help for *HyperCard* is more complete than the (excellent) manual. *PageMaker* 2.0 uses an innovative on-screen hypertext help program.
- Seek out local experts. You can often find an associate or friend who is experienced with a given program. Many nonprofessional experts enjoy being asked to solve challenging problems.
- Your local Macintosh user group can be a wonderful source of expertise. Group bulletin boards are electronic extensions of local experts. The only disadvantage is that bulletin boards are often small operations whose lines are frequently busy. To find the user group nearest you, call Apple at 800/538-9696, ext. 500.
- Specialized bulletin boards offered by CompuServe, GEnie, and The Source network services let you reach out and ask the computer nation for help. Queries to these BBSs can easily generate a dozen responses. Simply browsing through the correspondence



can tip you off to bugs and fixes, compatibility problems, and other headaches. Smart software companies monitor these boards, announcing problems and fixes they've found and learning of new ones. Smarter companies–Living Videotext, Borland, Microsoft, Adobe, and Aldus–maintain forums of their own on the networks.

- Build a reference library of magazines and books that address programs you use frequently. Mark tips with highlighter pens and flag useful stories. (To make it easier to locate past articles, *Macworld* is working to put its indexes into *HyperCard* stacks. Watch for details as they develop.)

Calling the Company

Of course, you will want to call the software publisher. Prepare your questions first, and be ready with basic information such as your Mac's model and serial numbers, software version numbers, and so on (see "Before You Become a Bug"). Publishers legitimately complain about lazy callers. Layered's vice president of marketing, David O'Connor, reports that more than half the calls his company receives are on topics covered in the documentation (and half of those aren't



DAN ESCOBAR

Seafirst Bank has created a variety of in-house resources to support its 2600 Mac users. Paratrainer Diane Wood (left) helps coworkers in addition to her normal job. June Honeycutt is a full-time trainer.

about *Insight* at all, but about Mac procedures like copying files). Acius president Guy Kawasaki says the reason his company doesn't have toll-free help lines is that "customers then call without even trying to read the manual."

The type of service you receive, once you get through to a software publisher, can vary considerably (see "Help Policies"). When phone lines get jammed, most publishers believe it's in the customers' interest to take their numbers and call them back, rather than keep them on hold. Charles Jackson, president of Silicon Beach Software, wants his tech support department to be able to answer all calls immediately. "No one ever talks about our tech support," says Jackson, "because it's so good. When we got to the point recently where we were having to return 12 calls a week, I added staff." According to tech support manager Mari Hughes, the department has now reduced the number of calls it returns each week to about 5, and she emphasizes that they're made "within five or ten minutes" of each incoming call.

Ironically Aldus, which has a good reputation, just moved to a hold system to improve service. "When customers call," says customer service manager Colleen Byrum, "it's because they're in trouble now, not one or two hours later when we call back." By increasing phone staff 40 percent, Byrum hopes to keep the maximum hold to about four minutes.

On the other hand, Microsoft's phone support has always drawn a lot of fire. The software giant's 20 Mac specialists get about 700 calls a day–that's 35 apiece each day. By way of comparison (although direct comparisons between companies are a little tricky), each member of the tiny Silicon Beach tech staff averages about 19 calls per day. One improvement Microsoft has



added is a computerized phone system that asks you to enter touch-tone numbers and then directs you to a Mac specialist. If you're using a dial phone, however, you still must wait for an operator.

When you call Microsoft, be sure to dial the number on the stub of your registration card, which, if you're lucky, you've kept with the instruction manual. Even though you may feel that it's you, not your software, who needs a little service, when you call Customer Service you'll discover you've dialed the wrong number; the help line you want is Product Support. (This departmental distinction may be clear to publishers but it's confusing to customers: generally, Technical Service or Product Support handles help questions; Customer Service tends to be a marketing arm that deals with registration, upgrades, and the like.)

Registered users of Aldus's *PageMaker* get 45 days of help (not toll-free) from the time of their first phone call, along with a guide to basic page design and a bimonthly newsletter. After that, you can buy a service contract for $100 a year, which provides five hours of toll-free help, big discounts on new program versions, and other benefits.

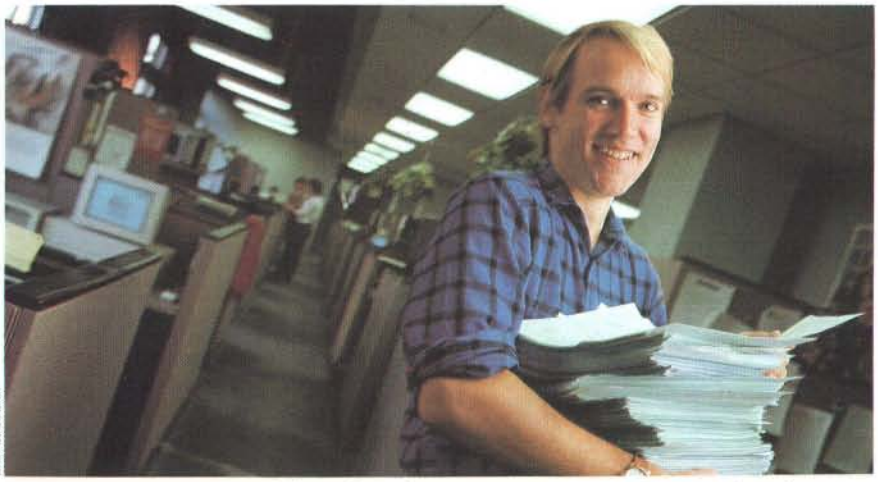
Apple

The consensus among Mac users is that Apple's software help has been awful. Call Apple, and you're referred to your dealer. Good luck. Now Apple has created a new company, Claris, to sell its existing applications software and to market new programs. (Apple will retain the Mac's System software and *HyperCard*.)

John Zeisler, vice president of marketing, says Claris is going to give better service than its parent. That means "great telephone support," new ways to sample software before buying it, and a variety of ways to reach users with help. The specifics are still being worked out, Zeisler says, but the perspective is different. "We want to be closer to the customer. If customer support is being asked the same question ten times a day, we'll rewrite the manual. If that doesn't solve it, we'll push the problem up to engineering, and make the program easier."

Apple has recently formed something called the Apple Training Alliance. The Alliance is writing curricula for training companies and dealers, and the first curriculum is for desktop publishing. It teaches the use of *PageMaker, Word, PowerPoint, Illustrator,* and *SuperPaint*.

The emphasis here is on the big-bucks training market, not the cash drain of consumer help. But one of Apple's qualification standards for the program is that people who take a Training Alliance course must



DAN ESCOBAR

Aldus technical support manager Ben Bauermeister lugs a stack of completed call reports. The 15 tech support reps take some 500 calls a day (the entire support department numbers about 31).

Board Games

Michael R. Hoffmann's law firm in Des Moines owns eight Macintoshes. Six have never needed repairs. But two Mac 512Ks have burned up five power supplies between them. After reading in *Macworld* that others have had similar experiences, Hoffmann decided he might not just be having bad luck.

Smoke Gets in Your Eyes

Inside the Mac are two electronic boards. The system board lies flat on the machine's bottom and performs computations. The analog board is mounted vertically on the Mac's left side and includes the power supply, the video sweep circuitry, and the loudspeaker. The Mac is generally a reliable machine, but the analog board has been a continuing source of trouble and controversy.

When an analog board blows, your Apple dealer swaps the smoking relic for another board, then usually tells you (as did Hoffmann's dealer) that the problem was the power supply. Perhaps as a result there is a widespread belief that the Mac 128K, 512K, and 512KE power supplies are too small.

But John Sawyer, partner and chief technician of CJS Systems in Berkeley, California–a Mac-techie heaven that does upgrades and repairs–says the Mac isn't underpowered. In fact, the problem could be nearly anything on the analog board. Most of the time, Sawyer says, the culprit is the flyback transformer–part of the video circuit. As proof, he points to a box of several hundred failed units. Sawyer says Apple substituted a beefier flyback transformer in the Mac Plus and SE and in late 512KEs, and he's seen very few analog-board problems in those models.



DAN ESCOBAR

John Sawyer of CJS Systems contemplates his collection of failed flyback transformers–the real culprits in many so-called power supply failures.

But that hasn't fixed Michael Hoffmann's flaming 5i2Ks (which, according to Hoffmann, actually just "smoked a lot"). In June he complained to Apple, asking for reimbursement for the bad boards he's replaced and either a permanent fix, replacement Macs, or a refund of the machines' fair market value (about $1,100 each). In September, Apple offered new boards and a free one-year service contract. Hoffman thinks Apple's offer suggests it hasn't solved the underlying problem. When this article went to press, he'd counteroffered: Hoffman was willing to settle if Apple reimbursed him $589.68 for his repair bills and covered the new boards' installation charges.

Repair, Replace, or Rip-off

If your Mac's out of warranty and an electronic component does fail, you can replace just the component or you can replace the entire board. Apple wants dealers just to swap boards, which doesn't require as much technical talent as repairing them. As a result, you can save money if you can find a good shop to do the repairs. CJS charges $108 to replace the flyback transformer and associated parts. But how much you save depends on what your local authorized Apple dealer charges. A random phone survey of dealerships nationwide brought in quotes from a low of $143 to a high of $268 for installing a new board.

be offered follow-up help, though it's not likely to be free, nor to last forever.

Know Your Rights

What should you expect when you buy software? The following software bill of rights is based on numerous conversations with both users and publishers. We're talking common sense and good business practices here, not the law, which lags far behind this fast-moving industry.



■ The program should work. No program is completely bug-free, particularly when first released. But, says Daniel Chayfetz of Odesta, maker of *Helix,* "When users pay hundreds of dollars for a product and then find hundreds of bugs, they're paying to be beta test sites." Many users felt that way after they bought *Microsoft Word* 3.0. Bulletin boards crawled with reports of more than 400 bugs by the time Microsoft rushed a free upgrade.

■ The program should fulfill its advertised promises. *Insight,* Layered's excellent accounting package, advertised that it would show dollar amounts to five decimal places. That capability was important to Steven Pinsky, owner of SRO, a film- and video-sound service in San Francisco; Pinsky might bill a customer $0.0655 per foot of magnetic film. But *Insight*'s first release showed amounts to only two decimals, falling somewhat short of the billing accuracy SRO needed and expected. Layered helped Pinsky work around the problem, but *Insight*'s deficiency burdened SRO, and Pinsky thinks Layered should have offered a partial refund or credit.

The new *Insight* release shows dollar amounts to five decimal places, and has been offered (for $15) to all registered users, but it took Layered 14 months to correct the problem. "A handful" of buyers got their money back, according to Layered's David O'Connor, but he concedes that customers like Pinsky who were inconvenienced got no breaks. He points out that all customers have received free help since July 1986, though Layered hasn't publicized the fact. Pinsky says Layered's help has been top-notch. But he notes that a mailing-label feature also promised originally still isn't in the new release.

Help Policies

Publisher	Time limit on help	Phone hours	Holds or calls back	Newsletter	Bulletin board forums	Tech sheets	Large-user specialist
Aldus	45 days*	7-6 PST	holds	yes	CompuServe	yes	yes
Ann Arbor Softworks	unlimited	9-5 PST	calls back			yes	yes
Apple	*	n/a	n/a				
Blyth	60 days*	8-5 PST	calls back	yes		in newsletter	yes
Borland	unlimited*	8-5 PST	calls back		CompuServe		
Centram	unlimited*	8-5 PST	calls back	yes		yes	
Cricket	unlimited	9-5 EST	calls back	yes		yes	
IDD	unlimited	8-5 PST	calls back				
Living Videotext	unlimited	9-5 PST	calls back		CompuServe		
Microsoft	unlimited	6-6 PST	holds	yes	CompuServe, The Source		
Odesta	unlimited	8-6 CST	calls back			yes	yes
Silicon Beach	unlimited	8-5 PST	calls back		BIX		

*See Comments.

Support policies of 12 representative software publishers. The information in this table reflects policies in force at press time.

Before You Become a Bug

About to call a software publisher for help? *Macworld* based this phone-support checklist on suggestions from Colleen Byrum, manager of customer service at Aldus. Follow it for faster answers and lower phone charges when you call a publisher.

- Register your purchase. Amazingly, only 30 to 60 percent of software buyers send in their registration cards. Most publishers won't answer your questions if you're not on file.
- At least try to read the manual. If it isn't clear, let the company know that's why you had to call for help.
- Try to identify the problem's source. If you've been found by a bug, immediately write down what sequence of events led to the crash. If the problem is a new one, did you do something you'd never done before? If you repeat your actions, does the problem occur again? Are you having strange problems with other programs, or just with one? "Mac Troubleshooting Tools" in the April 1987 *Macworld* outlines basic procedures for analyzing whether your difficulty comes from system or hardware problems, or from a glitch in the software.
- Have the numbers ready. Most phone techies will want you to provide the serial number of the program and the service contract number if you have one. Other information you're likely to be asked for includes your Mac's model; the amount of RAM installed; the names of any upgrade boards; and the version number of the System, the Finder, and the program you're using.

If you're on a network, they'll also want the name of the file server and the version number of its System software, the number of users on the network, and whether users share a System file or have their own.

Comments
45-day help limit begins with first call; toll-free phone number; one-year single-user service contract, $100.
Apple recommends contacting dealer.
60-day help limit begins with registration; one-year single-user service contract, $95-$195.
Toll-free phone number.
Centram says it will soon be selling limited, single-user service contracts.

- The program should have clear and complete instruction manuals.
- The program should be intuitive. You have a right to expect things to work the way you expect them to work.
- Fast and frequent information. Publishers should try new ways to get new information to you: bulletin boards, newsletters, tip and tech sheets, upgrade notices. How easily you get phone help tells you a lot about the publisher's commitment to its product and customers.
- If you're a registered owner, the publisher should notify you by mail about program upgrades and offer you substantial discounts on revisions that include major changes and improved features. Upgrades that primarily fix bugs should be sent free.
- No buck-passing. If you're using a reasonably standard combination of software and hardware, a call for help to one company should get you a solution, not a referral. It's the developers' responsibility, not yours, to make their products work together. □

See *Where to Buy* for product details.

The Ethernet Solution

Ethernet brings high performance to Macintosh networks

by Brita Meng

Until recently, if you wanted to network Macintoshes, AppleTalk was the only solution. Of course you could purchase alternative cabling systems, such as Farallon's PhoneNet, but regardless of the cable you chose, the 230K bits-per-second speed limitation remained. Because AppleTalk is a network architecture–not just the connector boxes and cables attached to the Mac–Apple was able to develop EtherTalk, a speedier yet compatible alternative to the original AppleTalk network (now dubbed the AppleTalk Personal Network). EtherTalk, based on standard Ethernet cabling, maintains compatibility with existing AppleTalk software and offers networkers a much higher performance alternative.

Originally designed at Xerox in 1976, Ethernet is a high-speed communications medium that allows information to travel over the network at up to 10 megabits per second. Because Ethernet is also a standard adopted by the Institute of Electrical and Electronic Engineers (IEEE), almost every computer–now including the Mac–has access to Ethernet. This includes the supercomputers from Cray, the VAX from Digital Equipment Corporation, the IBM PC, and UNIX workstations, such as those from Sun Microsystems and Apollo Computer.

Like the AppleTalk Personal Network, in its simplest form Ethernet is configured as a bus–a single ca-

ble open on both ends–as opposed to a ring or loop system. Conceptually, an Ethernet network looks something like a tree, whose limbs are nodes (individual computers) and whose trunk is the Ethernet cable.

Installation of cable is usually the most costly part of setting up a network. Ethernet provides several wiring schemes that span a range of price and performance (see "Choosing Your Cable").

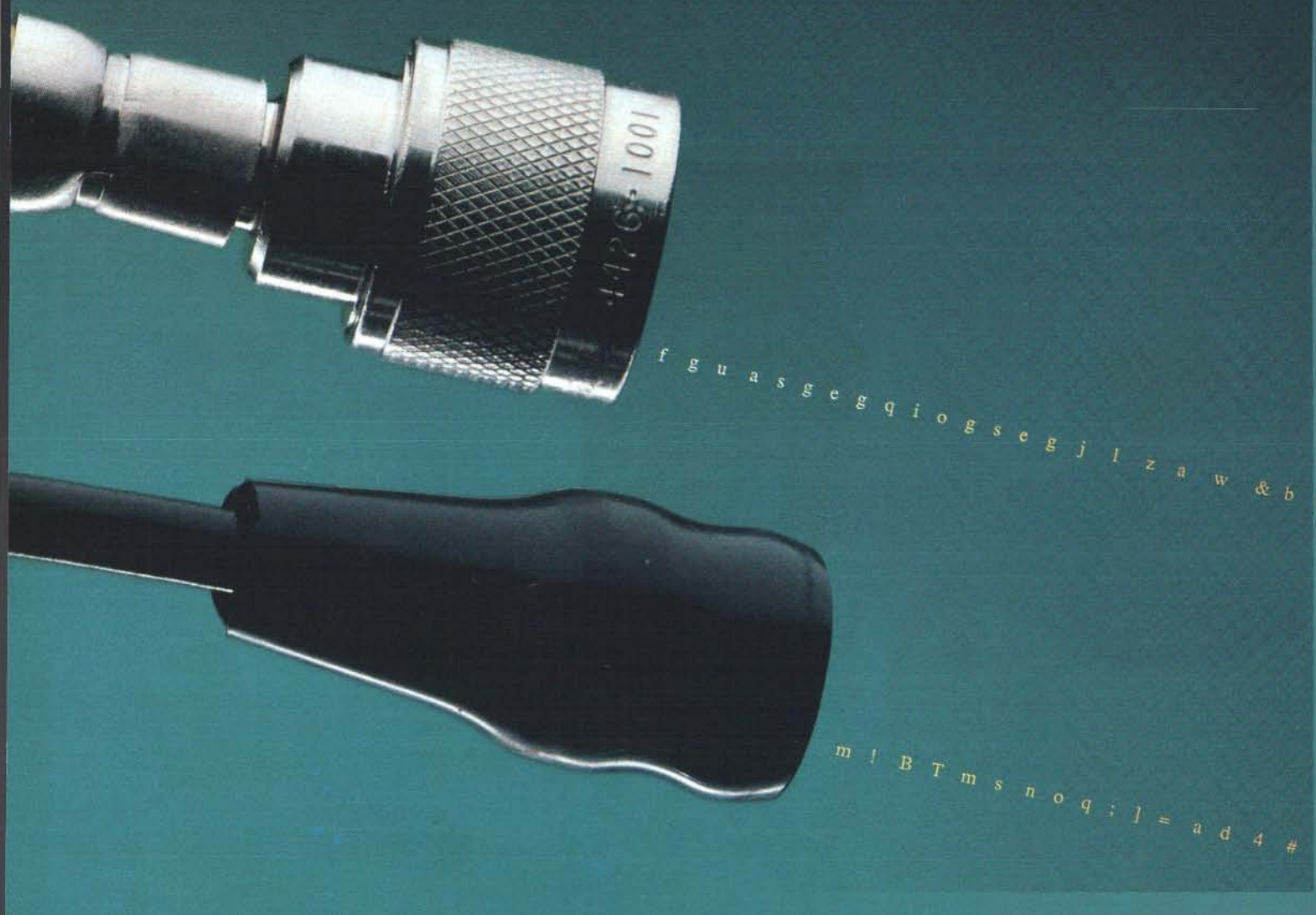
The physical connection to the Ethernet cable is made by a connector, or *tap.* Different types of cable use different types of taps. A tap connects to an Ethernet transceiver, which handles the receiving and sending of information over the cable. Finally, the computer-resident Ethernet controller is reponsible for assembling and disassembling data into packets so the Mac can transmit and receive information across the network.

Network Configurations

One way to use Ethernet is as a local area network (LAN). This connects every Mac in a work group with Ethernet cable. For example, an engineering work group may need to access and share very large CAD files on a network file server, or perhaps several users need to access one large database. Using Ethernet speeds up the network for such applications.

If the problem is not to get information to and from group members, but rather to get information to and from different work groups altogether, an Ethernet *backbone* (a central thoroughfare with tributary networks) may be the logical solution. This configuration fills the bill for departmental communications networking. For example, an Ethernet backbone might link separate AppleTalk work groups, themselves connected with twisted-pair wire, PhoneNet, or even Du Pont's fiber-optic AppleTalk. If you already have AppleTalk networks, there's no need to rewire them for an Ethernet backbone.

Because Ethernet is a *multiple-protocol medium,* several networking protocols–for example AppleTalk, DECnet, and TCP/IP–can run on it simultaneously. This capability lets you to create a corporate networking



PHOTOGRAPHS BY MEL LINDSTROM

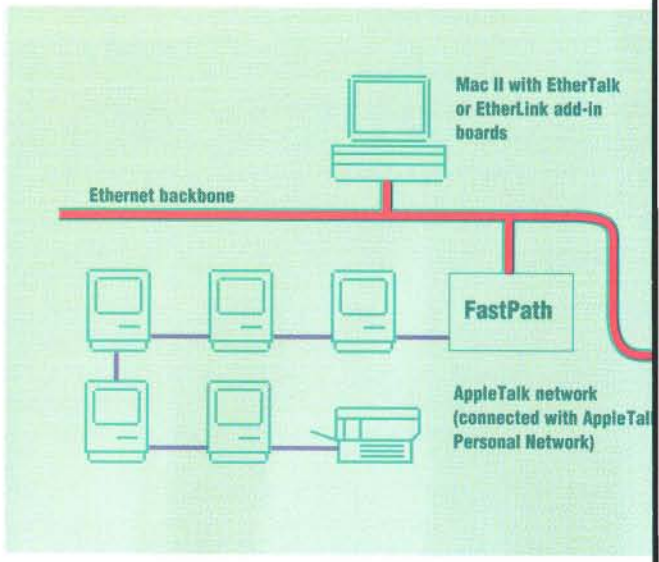
scheme, connecting all types of computers, without having to install different cables for each type of network connection–or worse, having to rewire a previously established network.

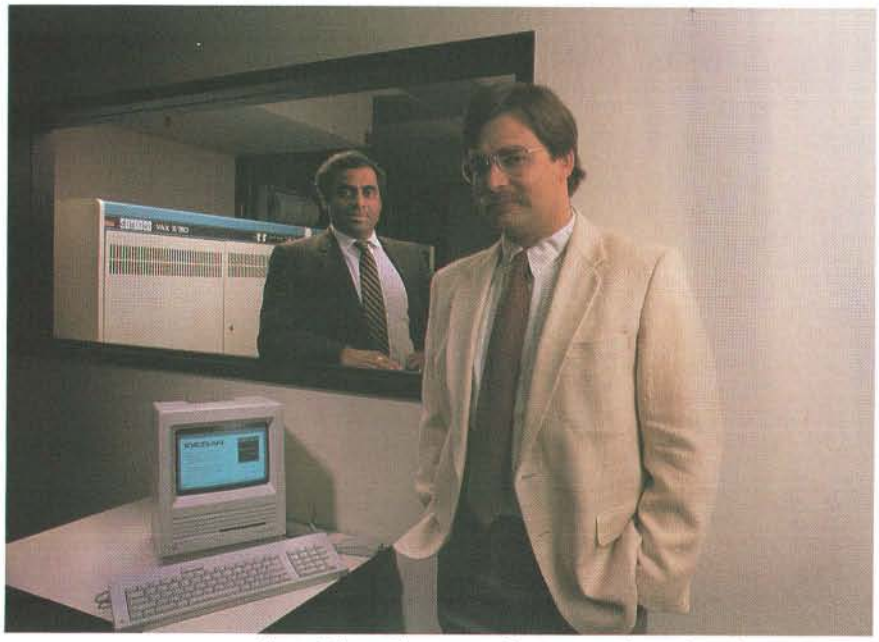
Name Your Protocol

Software protocols are necessary to run network services, such as E-mail and file servers, and also to guarantee reliable transmission and reception of data over the network. Even the AppleTalk Personal Network cable is useless without the AppleTalk protocols, the set of rules that govern communication over the twisted-pair wire. The same is true for Ethernet. Once you've connected the Macs with Ethernet cable, you still need the network protocols to communicate via Ethernet.

A full-fledged network requires an entire suite of protocols. Each protocol in the suite has various responsibilities. To help organize the protocols, the International Standard Organization (ISO) has developed a networking reference model that makes it easier for companies to ensure that different computers can talk to each other. The AppleTalk network architecture is a complete implementation of the ISO reference model.

The Ethernet standard is an integral part of the ISO model. Consequently, many different networking protocols can run over Ethernet. Because different computers use different protocols, the type of protocol your network needs depends on the type of computer (or computers) you will connect to your Mac.





Steve Nelson (foreground), vice president of marketing for Kinetics, and Subhash Bal, Excelan's vice president of marketing. Excelan's acquisition of Kinetics now links the Mac to Excelan's existing TCP/IP product line.

EtherTalk

Apple's EtherTalk is a high-speed alternative to the AppleTalk Personal Network. EtherTalk lets you run AppleTalk protocols directly over Ethernet, rather than over the traditional twisted-pair wire. Thus, AppleTalk networks take advantage of Ethernet's speed and capacity. A single EtherTalk network can include up to 254 nodes and 1000 meters of cabling.

EtherTalk and the AppleTalk Personal Network use the same upper-level protocols–for example, the AppleTalk Filing Protocol (AFP). As a result, most application software runs with both AppleTalk architecture implementations, regardless of the type of cable that connects the network's computers.

DECnet

Digital Equipment Corporation has its own networking/communications framework called Digital Network Architecture (DNA). DECnet is the name given to the set of software protocols necessary to adhere to DNA. The primary communications medium used for DECnet is Ethernet cable.

DECnet is similar to the AppleTalk architecture. It has its own complete suite of protocols for everything from E-mail to file directories. Both DECnet and AppleTalk are protocols for specific computer families, developed by the computer system vendors. Both protocols offer high-level network services such as file sharing and E-mail. If your Mac has access to DECnet protocols, you can take advantage of the services the DEC environment offers.

TCP/IP

TCP/IP (Transmission Control Protocol/Internet Protocol) is a set of protocols used to transfer data on Ethernet. Developed by the United States Department of Defense, TCP/IP is a de facto industry standard for communications between different computer systems.

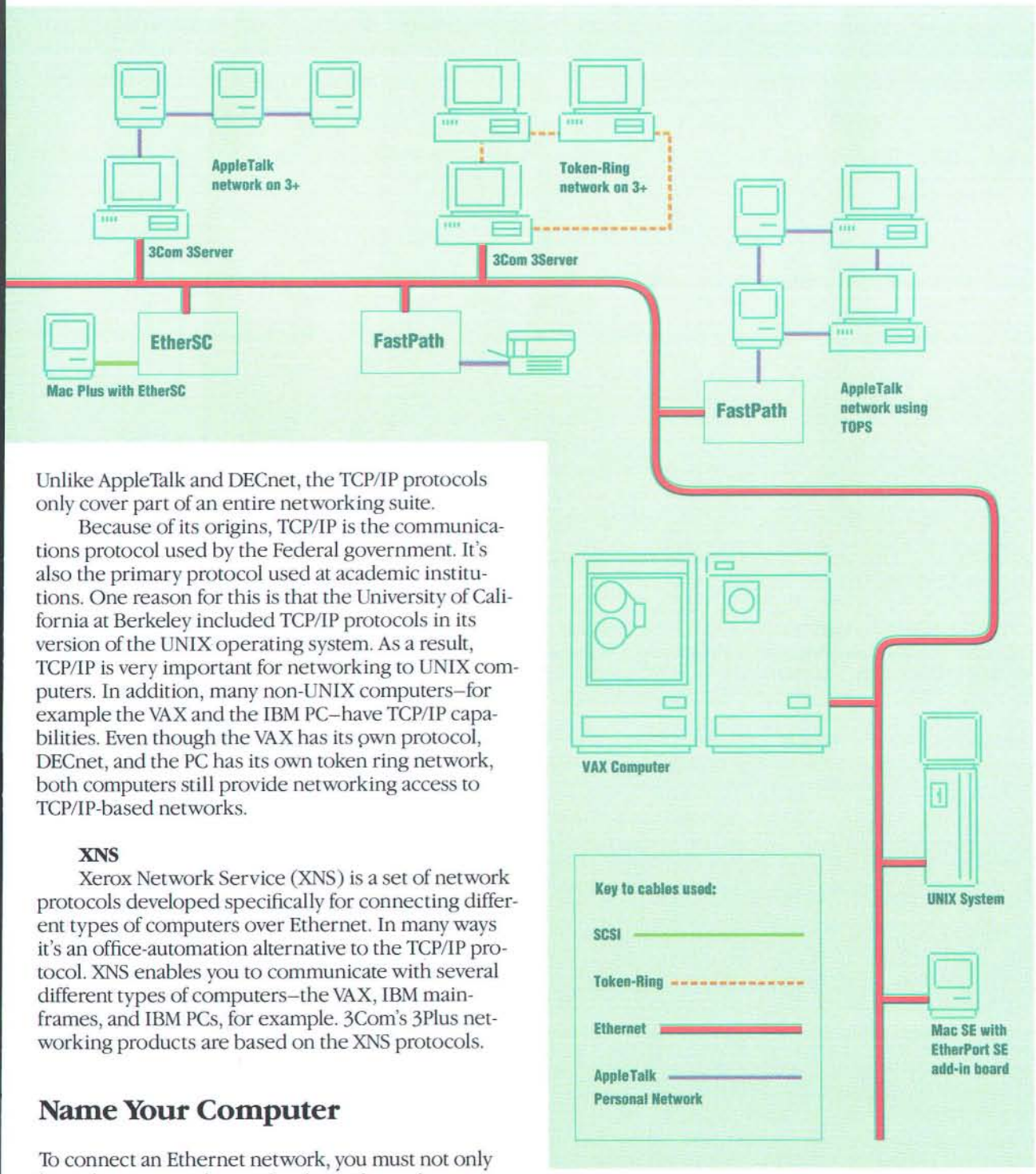


Figure 1
Individual Macs as well as entire AppleTalk-based workgroups can communicate with one another and with larger VAX and UNIX-based systems over an Ethernet backbone.

Unlike AppleTalk and DECnet, the TCP/IP protocols only cover part of an entire networking suite.

Because of its origins, TCP/IP is the communications protocol used by the Federal government. It's also the primary protocol used at academic institutions. One reason for this is that the University of California at Berkeley included TCP/IP protocols in its version of the UNIX operating system. As a result, TCP/IP is very important for networking to UNIX computers. In addition, many non-UNIX computers–for example the VAX and the IBM PC–have TCP/IP capabilities. Even though the VAX has its own protocol, DECnet, and the PC has its own token ring network, both computers still provide networking access to TCP/IP-based networks.

XNS

Xerox Network Service (XNS) is a set of network protocols developed specifically for connecting different types of computers over Ethernet. In many ways it's an office-automation alternative to the TCP/IP protocol. XNS enables you to communicate with several different types of computers–the VAX, IBM mainframes, and IBM PCs, for example. 3Com's 3Plus networking products are based on the XNS protocols.

Name Your Computer

To connect an Ethernet network, you must not only have the proper Ethernet hardware for each computer but also the software drivers that implement the specific protocols. In some cases, the hardware comes complete with the software drivers. In others, mixing and matching hardware and software from various communications vendors is necessary.

Mac-to-Mac

To implement EtherTalk, you need a hardware Ethernet controller for each Mac and the AppleTalk protocol software support for the Ethernet controller. The networking protocols for EtherTalk and AppleTalk

Choosing Your Cable

While coaxial cable is the primary physical medium for Ethernet, two other options, fiber-optic cable and twisted-pair wire, are also available. The type of cable, or combination of cables, you choose depends on your budget, performance, the distance between your stations, and the environmental requirements of your network.

Thick Ethernet Thick coaxial cable is the older IEEE medium for Ethernet. This cable measures a little less than ½ inch in diameter and can extend almost 2 miles without signal degradation. Because of its size, thick Ethernet cable can be difficult to install inside a building. (It's very awkward to run something ½-inch thick through ceiling conduits.) Consequently, thick Ethernet is usually run between buildings as a backbone to connect work groups. The thick cable's low signal loss makes it a good choice for connecting networks over long distances. However, its low signal loss also makes thick coaxial cable relatively expensive. It is not very practical for interconnecting individual computers because of the added expense for external transceivers and the rather unwieldy size and inflexibility of the cable itself.

Thin Ethernet The predominant type of Ethernet cable now being installed is thin coaxial cable. Thin Ethernet is a compromise between cost and the distance the cable can span without signal degradation. Thin Ethernet cable is about one-quarter the price of thick Ethernet. The cable itself is about 3/16 inch in diameter—much like the cable that runs from a television cable box. T taps, which connect a computer to thin coaxial Ethernet, are more accessible and easier to locate than the external transceivers necessary for attaching thick coax Ethernet.

Fiber-Optic For a long time, fiber-optic cable has been suggested as a replacement for coaxial cable systems. And with prices dropping, it's becoming a more cost-effective solution for some types of networks.

Fiber-optic cable has a greater range than coax—up to 2½ miles. It's immune to electromagnetic and radio-frequency interference (EMI/RFI), thus reducing noise-induced network errors. This last quality makes installation of fiber-optic cable appropriate in EMI/RFI-susceptible areas (on factory floors, for example). Fiber-optic cable cannot be short-circuited, so you can install it under water or in locations susceptible to flooding. Fiber-optic networks are also difficult to tap into illegally, making them more secure than coaxial networks.

Physically, fiber-optic cable is smaller, lighter, more flexible, and more elastic than coaxial cable. These properties simplify cable handling and installation. While the cable itself may cost more, it may be less expensive to install and maintain than conventional coaxial cable. One company making fiber-optic connections for Ethernet is Codenoll Technology Corporation of Yonkers, New York.

Telephone Wire You can now run Ethernet over existing telephone wire. 3Com's PairTamer is an adapter that lets you install standard Ethernet on an unused pair in a typical telephone wiring bundle. Like Farallon Computing's PhoneNet, the adapter takes the place of the standard modular phone outlet. Ethernet and a voice telephone line can coexist on PairTamer. Depending on the number of pairs in the phone wire bundle, you can also have simultaneous access to AppleTalk.

A short piece of thin coaxial cable (called a *drop cable*) runs from PairTamer to each computer. You must have a PairTamer on the other end of the Ethernet telephone line for a good signal. To configure an Ethernet network, 3Com provides MultiConnect, which acts like the phone closet for PhoneNet. MultiConnect lets you mix and match thin coaxial, fiber-optic, and twisted-pair cabling lines.

are the same. Any other AppleTalk network device, such as a LaserWriter, also needs access to the Ethernet cable.

Developed jointly by Apple and 3Com, the EtherTalk Interface Card is a Mac II add-in board that offers direct access to Ethernet. 3Com also plans to sell its own version of the Mac II EtherTalk card, which it will call EtherLink. The Apple and 3Com boards will be exactly the same. The EtherPort SE board from Kinetics provides the Mac SE with an Ethernet connection. All three boards allow you to use either thick or thin coaxial cable.

Also from Kinetics, EtherSC uses any Mac SCSI connector to hook into an Ethernet network. And to

connect a LaserWriter, you'll need an AppleTalk-to-Ethernet gateway, such as Kinetics' FastPath. FastPath has one AppleTalk and one Ethernet connector. So if you want to configure a local EtherTalk network, simply use the FastPath to connect a LaserWriter or any other AppleTalk device that does not have Ethernet access.

FastPath also allows you to connect entire AppleTalk networks to an Ethernet backbone. These workgroup networks can be linked either with traditional twisted-pair wire (AppleTalk Personal Network) or with PhoneNet.

The EtherTalk Interface Card, EtherLink, EtherPort SE, EtherSC, and FastPath are all configured to allow true Mac AppleTalk software to use Ethernet transparently. Since EtherTalk is really AppleTalk, you can still use all your present AppleTalk-based applications, such as E-mail and file servers.

Non-Apple Machines

Because of standardization, Ethernet is a good way to network the Mac to other types of computers. There are two ways to provide communications software compatibility between the Mac and other machines. One method is to implement AppleTalk protocols on the "foreign" computer. By putting AppleTalk protocols on other machines, you maintain the Mac interface over the network. For example, you can run AppleShare using a VAX as a file server–or use a VAX as a print queue for a LaserWriter.

The second method of implementing protocol compatibility puts other non-AppleTalk protocols, say DECnet or TCP/IP, on the Mac. In some cases, the protocol software, or *driver,* is sold separately; in others, the driver for a particular protocol comes with the Ethernet controller.

PCs and the Mac

Three PC-Mac network solutions use the AppleTalk protocols, with AppleTalk running on the PC. However, none of the manufacturers currently offers a PC Ethernet board for the EtherTalk protocols.

Apple's *AppleShare PC* requires the AppleTalk PC card for the IBM. At present this card does not offer an Ethernet connection. While Apple did design the AppleTalk PC card, it has no plans to design the hardware for a PC Ethernet controller with AppleTalk protocols. Such a board will have to come from a third-party developer. Although numerous Ethernet controllers are offered for the PC, none currently implement the AppleTalk protocols.

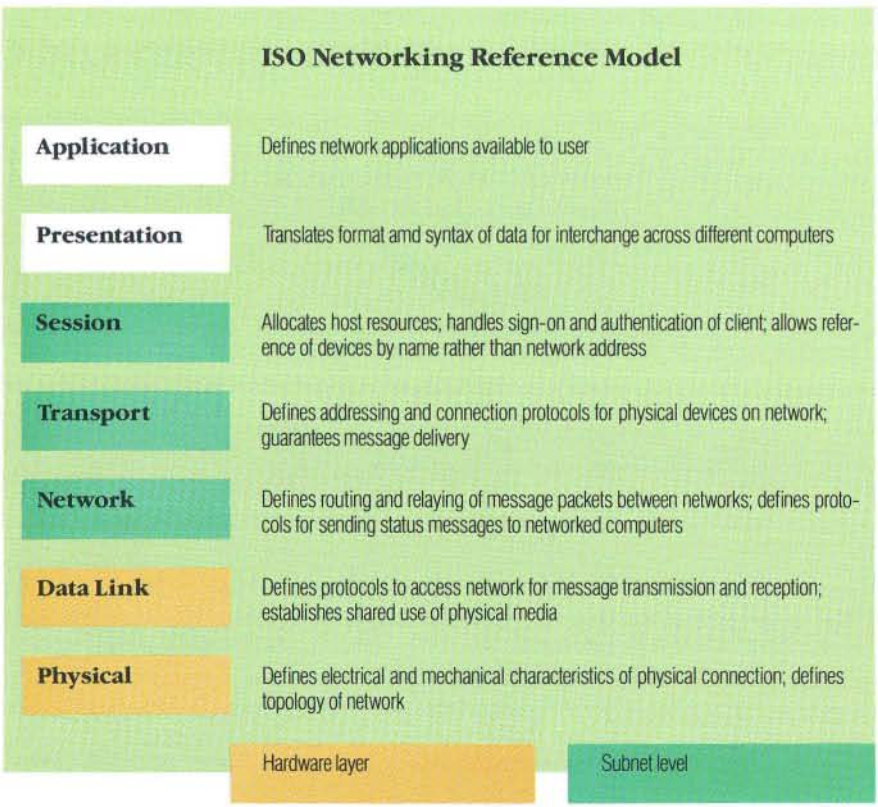
TOPS is working on a solution for *TOPS PC* access to EtherTalk. Its TOPS Interface Card currently works only with the AppleTalk Personal Network twisted-pair wire. In addition, Tangent Technologies is rewriting its *PC MacBridge/AFP* software so that IBM PCs can access the *AppleShare* file server with EtherTalk. The company is talking to several PC Ethernet board manufacturers about combining its software with PC Ethernet boards.

3Com uses the XNS protocols, instead of the AppleTalk protocols, to enable file sharing between PCs and Macs. In this case, the 3Server3 hardware is the gateway between the PCs and the Mac. The 3Server3–actually a PC using a 3Com-modified version of MS-DOS for a network operating system–not only routes XNS packets from the Mac to the PC, and vice versa, but is also a file server. Each server can support two networks simultaneously.

Right now 3Com's *3+* software supports three types of networks with XNS: AppleTalk, Ethernet, and Token-Ring. There is no direct connection for AppleTalk to Token-Ring currently, although 3Com does expect to release one in early 1988. Consequently, these two local area networks must use Ethernet to talk to each other.

In such a setup one 3Server3 is configured as a Token-Ring/Ethernet server; another as an AppleTalk/Ethernet server. By connecting the two servers with Ethernet, you can network the two different network types. XNS is the intermediary protocol between the two. 3Com is now implementing the EtherTalk version of XNS translation software so that you will be able to network the Mac SE and Mac II directly into the 3Server3 over Ethernet. You can use either the EtherLink or EtherPort SE controllers for the Mac. At this time 3Com has no plans to support a SCSI-to-Ethernet connection.

Another way to connect the Mac to the PC via Ethernet link is by using a foreign protocol, namely TCP/IP, on both machines. There are several vendors of TCP/IP and Ethernet controllers for the PC. PC Excelan



of San Jose, California, Bridge Communications of Mountain View, California, and Micom-Interlan of Boxborough, Massachusetts are examples of companies that provide Ethernet controllers and TCP/IP protocol support for the PC.

On the Mac side, Pacer offers a version of its *pcLink* software for TCP/IP protocols. *pcLink* provides terminal-emulation and disk-server functions over Ethernet, via Kinetics' Ethernet controllers.

Computers from DEC

Two products run AppleTalk protocols over Ethernet (or EtherTalk) to network the Mac with the VAX. AlisaTalk, from Alisa Systems, enables the Mac to access services on the VAX computer via FastPath. Pacer Software's AppleTalk version of *pcLink* also implements AppleTalk protocols over Ethernet, giving Macs access to VAX computers for terminal emulation and disk sharing.

Based on Ethernet, DECnet networking protocols are available on the Mac from two double-vendor teams. Alisa Systems and Thursby Software Systems provide DECnet for the Mac. This networking package, called TSSnet, supports DECnet over Ethernet or asynchronous RS-232 lines. Ethernet access is via Kinetics' EtherSC or EtherPort SE controllers, which are also supplied by Alisa.

TSSnet attaches the Mac to DECnet so that the Mac looks exactly like a DEC node—no different from any other VAX on the network. It enables remote terminal access, file transfer, and remote file-access services over DECnet. In addition, a background listener allows you both to receive and to send VMS mail to DEC *All-In-One* users. Because the Mac is a DECnet node, it has equal client and server status with other DEC computers. As a result, you can edit a Mac file with a VAX-resident editor.

Dove Computer Corporation and Technology Concepts have jointly developed a DECnet solution for the Mac. The Mac accesses DECnet with Dove's FastNet Communication Control Unit. FastNet connects to the Mac via the SCSI port or RS-422 serial port; an Ethernet cable port connects the FastNet to the network. CommUnity, from Technology Concepts, is a portable implementation of DECnet. Like TSSnet, it also provides remote-terminal, task-to-task communications, and remote file-transfer and file-access services.

FastNet is an intelligent controller, with its own microprocessor and memory. This means that FastNet handles some of the lower-level DECnet communications overhead, resulting in a performance improvement under a heavy network load. However, because parts of the DECnet software reside in the FastNet, you need FastNet in order to run CommUnity. You can't use

Boosting Your Speed and Capacity

Ethernet's 10-megabit-per-second data rate means it transmits information more than 40 times faster than AppleTalk's twisted-pair wire. Coaxial cable allows more nodes per network and enables greater distances between nodes.

Because Ethernet coaxial cable is physically larger than twisted-pair copper wire, networks using Ethernet have greater bandwidth, or capacity. And because Ethernet is a wider highway, more people can use the media before cable capacity is reached. That means that network speed appears to be faster.

Although the advantage of Ethernet lies primarily in its larger capacity rather than in its faster speed, it's important to know that your file server will not run 40 times faster on Ethernet than it does on AppleTalk wire. Nor will your laser printer necessarily print any faster if it is on an Ethernet network. For one thing, Ethernet's 10MB-per-second data rate is a burst, or peak, speed; the sustained Ethernet data rate is more like 2.5MB per second. So you'll see only an increase of 10 times the previous speed.

In most cases, the speed of the network does not cause the bottleneck. Instead, CPU speed or disk input/output (I/O) time slows network performance. This problem is exacerbated when several users all try to access the file server at one time.

When you are laser printing a PostScript document, the bottleneck is caused not only by the speed at which the Mac can generate a PostScript file, but also by the speed at which the laser printer can print. In fact, tests done at Apple showed that in the 2000 seconds it took to print one document, only 8 seconds were spent on the network. If you use a direct Ethernet connection for a LaserWriter, you will see no difference in print speed.

You should expect a moderate improvement running *AppleShare,* especially if your network is large. The real speed gain comes if you have a Mac II server/client combination for *AppleShare* (simply because of the faster Mac II processor). Apple reports that a Mac II on Ethernet can result in file server performance similar to SCSI access speed for a hard disk.

Software by Protocol

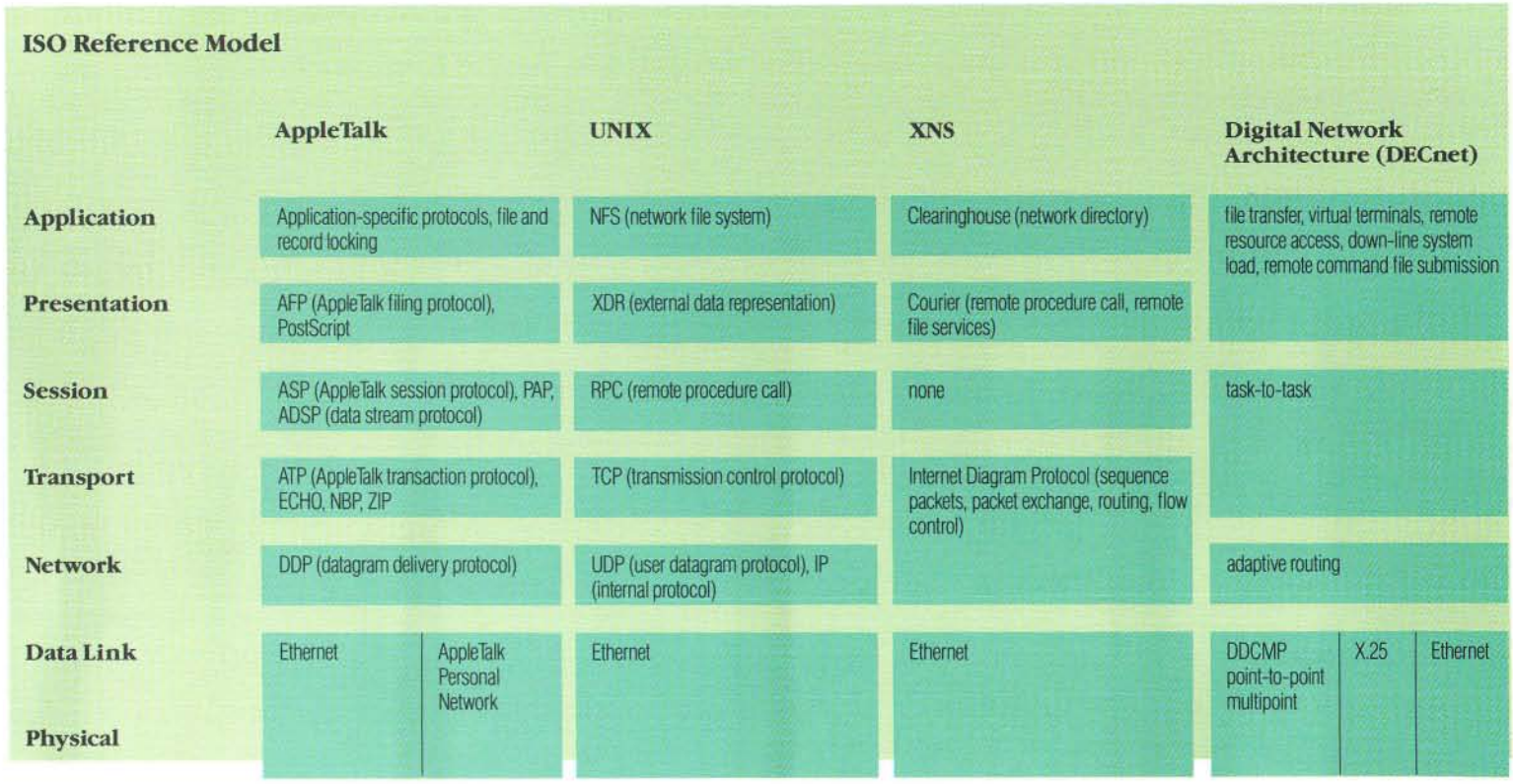
Protocol	Product	Company	Price	Comments
AppleTalk	AlisaTalk	Alisa Systems	$3750 to $11,500	Connects Mac to VAX; includes file-server, print-spooler, and remote-terminal modules; compatible with entire line of Kinetics products.
	AppleShare PC	Apple Computer	n/a	Implements AppleTalk protocols on PCs so PCs can be part of AppleShare; requires AppleShare PC card for PCs.
	EtherTalk	Apple Computer	$699	AppleTalk Personal Network option for running AppleTalk applications; requires Ethernet hardware controllers with AppleTalk protocol support.
	K-Talk	Kinetics	$875 to $3500	Implements AppleTalk protocols for UNIX systems; K-Term terminal emulator and K-Spool UNIX-based LaserWriter spooler also available.
	pcLink	Pacer Software	$2000 to $37,500	Communicates directly to VAX systems, with AppleTalk protocols on VAX; includes terminal emulation, file transfer, virtual disk, and host printer access.
	TOPS	TOPS	$189 to $239	Uses AppleTalk protocols to connect Macs, PCs, and UNIX systems; PCs and UNIX systems require TOPS Network Interface Card; allows computers to share files, disks, and peripherals directly; no PC Ethernet access yet.
TCP/IP	pcLink	Pacer Software	$2000 to $37,500	Implements TCP/IP protocols on Mac for networking to UNIX systems; includes terminal emulation, file transfer, virtual disk, and host printer access.
	TOPS Terminal	TOPS	n/a	Provides AppleTalk link to TCP/IP networks; runs via AppleTalk/Ethernet bridge such as FastPath; offers multiple terminal-emulation windows and transparent file editing across environments.
DECnet	CommUnity	Technology Concepts	$400	Connects Mac to VAX, with Mac as DECnet node; provides virtual terminal and VT220 emulation, task-to-task communications, remote file access and transfer, network management; requires FastNet Ethernet controller from Dove Computer.
	Alisa TSSnet	Alisa Systems	$299 to $349	Connects Mac to VAX, with Mac as DECnet node; provides file transfer, VMS mail with background listener, remote-terminal service; uses Kinetics EtherSC or EtherPort SE (supplied by Alisa).
XNS	3+	3Com	$495	Supports IBM PC and Macs over 3+ network; AppleTalk and Token-Ring protocols sent via XNS over Ethernet; 3Server translates and filters information; supports EtherLink, EtherTalk, and EtherPort SE interface boards.

CommUnity with the Ethernet controller from Kinetics, which doesn't have the lower-level DECnet protocols installed.

UNIX Systems

Kinetics' *K-Talk* and TOPS's *TOPS* both provide AppleTalk protocols for UNIX machines. You install Kinetics FastPath/M or FastPath/Q boards to bring AppleTalk protocols to the UNIX host. The *K-Talk* software runs on the Mac and lets Macs communicate with the UNIX host via AppleTalk protocols over Ethernet.

TOPS for UNIX has the capability to connect Macs, PCs, and UNIX systems using its own TOPS command language. *TOPS* software translates network requests from the TOPS command language into UNIX commands, and vice versa. The UNIX computer is



physically linked to the AppleTalk-based *TOPS* network by either an Ethernet/AppleTalk gateway for the Mac, or an AppleTalk add-in board for the UNIX system. You can also use Pacer's TCP/IP implementation, *pcLink,* to connect the Mac to UNIX-based TCP/IP machines.

TOPS has also introduced a software AppleTalk link to TCP/IP-based networks. Called *TOPS Terminal,* it enables Macs to communicate with all TCP/IP computers via an Ethernet card or an AppleTalk/Ethernet gateway. The program allows Mac users to connect to any number of hosts simultaneously through multiple terminal-emulation windows. The number of host connections is limited only by the Mac's available RAM; TOPS claims to have run more than a dozen connections at the same time on a 512K Mac. You can also edit files from UNIX machines or PCs on *TOPS*- or TCP/IP-based networks.

TOPS for UNIX also allows you to use a UNIX system, such as a Sun workstation, as a gateway. In connecting with the Sun, the Mac can communicate with any node to which the Sun is attached. Because the Sun runs a high-level networking protocol called NFS (Network File System) with TCP/IP, the Sun's connection universe is in some respects greater than the Mac's.

NFS, developed by Sun Microsystems, TOPS's parent company, allows transparent remote file access on multivendor networks. NFS is now supported by more than 132 computer companies, including DEC, Apollo Computer, Data General, and Apple.

TOPS Terminal is TOPS's first step in converging *TOPS* and NFS. With NFS running directly on the Mac, the Mac will more easily access files on other NFS systems. TOPS expects to merge the current *TOPS* systems to NFS during the course of this year—without having to change the way users work with *TOPS.* In the meantime, another effort to bring NFS to the Mac under the Macintosh operating system is underway at the University of Michigan. That project is being done under contract for Apple.

A/UX

While the Macintosh operating system offers Ethernet connections to a variety of computers, A/UX—Apple's version of UNIX—promises to tie the Mac into even more Ethernet environments. In fact, the EtherTalk board was considered a major factor in the development of the Mac's UNIX operating system.

Included in the A/UX operating system are AppleTalk and TCP/IP protocols. So, under A/UX you'll be able to connect to both types of networks with Ethernet.

To connect to other UNIX systems via TCP/IP, you'll need the EtherTalk board, which allows you to perform file transfers and use the UNIX E-mail system. In addition A/UX also supports NFS from Sun.

NFS, however, is not the only multivendor networking environment the Mac will be involved with. The Network Computing Forum is a group of leading corporations and research centers that are focusing on

Hardware Paths

Mac Model	Product	Company	Price	Comments
Mac 512KE	FastNet	Dove Computer	$899	Mac 512KE must have SCSI adapter; can also be connected to serial port (RS-422); equipped with 512K of RAM and 68000 processor; supports DECnet protocols with CommUnity.
	FastPath	Kinetics	$2500	Supports Ethernet connection to any AppleTalk device; also connects entire AppleTalk LAN to Ethernet backbone; acts as AppleTalk/Ethernet bridge or gateway.
Mac Plus	EtherSC	Kinetics	$1250	Uses SCSI port to connect Mac directly to Ethernet; supports AppleTalk and TCP/IP protocols.
	FastNet	Dove Computer	$899	Can be connected via either SCSI or serial port; supports DECnet protocols with CommUnity.
	FastPath	Kinetics	$2500	Supports Ethernet connection to any AppleTalk device; also connects entire AppleTalk LAN to Ethernet backbone; acts as AppleTalk/Ethernet bridge or gateway.
Mac SE	EtherPort SE	Kinetics	$850	Add-in board for Mac SE; fully compatible with other Kinetics Ethernet controllers; supports both AppleTalk and TCP/IP protocols.
	EtherSC	Kinetics	$1250	Uses SCSI port to directly connect Mac to Ethernet; supports AppleTalk and TCP/IP protocols.
	FastNet	Dove Computer	$899	Can be connected via either SCSI or serial port.
	FastPath	Kinetics	$2500	Supports Ethernet connection to any AppleTalk device; also connects entire AppleTalk LAN to Ethernet backbone; acts as AppleTalk/Ethernet bridge or gateway.
Mac II	AST-ICP	AST Research	$999	Add-in communications board for Mac II under A/UX operating system; can act as Ethernet (TCP/IP) and AppleTalk bridge for multitasking A/UX.
	EtherLink	3Com	TBA	Add-in board for direct Ethernet access; includes AppleTalk protocol support; will include XNS support; can be used under A/UX.
	EtherTalk Interface Board	Apple Computer	$699	Add-in board for direct Ethernet access; includes AppleTalk protocol support.
	FastNet	Dove Computer	$899	Can be connected via either SCSI or serial port.

a new approach to computing. Apple is a member of that forum.

The approach, called *network computing,* was pioneered by Apollo Computer. Network computing allows different parts of a single application program to be distributed to computers best suited for each task. For example, the artificial intelligence portion of an application might best be run on a specific artificial intelligence workstation. That portion of the application could be automatically, and transparently, passed over the network to the AI workstation.

The goal of network computing is to take advantage of the strengths of very diverse computers–not just personal computers, but supercomputers, parallel processors, and minicomputers, all networked via Ethernet. □

See *Where to Buy* for product details.

The PostScript Difference

by Erfert Nielson

Drawing the lines between PostScript graphics applications: Cricket Draw, Illustrator, and LaserPaint compared

For Mac artists accustomed to the rough brushstrokes of bit-mapped painting programs, the transition to PostScript graphics is a quantum leap from the cave paintings of Lascaux to the fluid lines of Botticelli. PostScript graphics programs provide a direct link to a powerful programming language. At this time, three such programs are available: *Cricket Draw, Adobe Illustrator,* and *LaserPaint.* Others are just around the corner (see "P.S. There's More"). Each program has its own unique character, and each is appropriate for certain tasks. If you're considering buying a PostScript graphics package, the following comparison should help you decide which one meets your requirements.

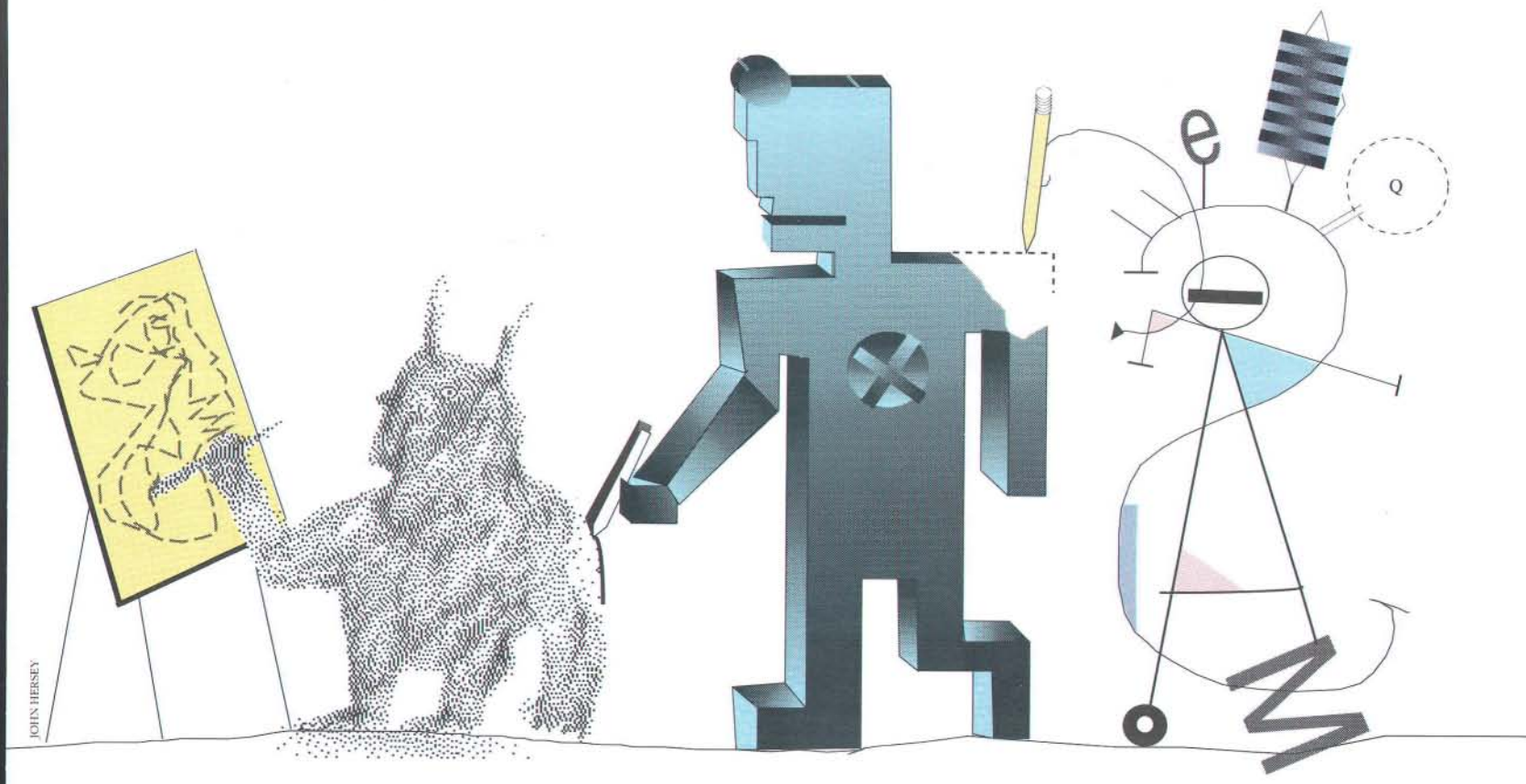
These three programs have been reviewed in previous issues of *Macworld;* for a detailed description of each, see "Rounding the Bezier Curve" (*Cricket Draw*), May 1987, "Illustrator: The Tracer's Edge," June 1987, and *Reviews,* September 1987 (*LaserPaint*). For a look at each program's color-separation capabilities, see "Beyond Black and White," *Macworld,* November 1987.

Why PostScript?

PostScript is the page-description language that resides in the LaserWriter and a handful of other *raster output devices*–devices that map an image as an array of individual pixels. A page can contain a combination of text, computer-generated graphics, and scanned images, all of which can be printed on a medium-resolution device like the LaserWriter or a high-resolution device like a Linotronic phototypesetter. One of the beauties of PostScript is the fact that it's *resolution-independent*–the same image can be output at the LaserWriter's 300 dots per inch (dpi), at 1270 dpi on a Linotronic 100, or at 2540 dpi on a Linotronic 300.

In the case of the LaserWriter, the LaserPrep utility translates commands from QuickDraw, the Mac's graphics language, into PostScript. But even with a good interpreter, subtleties are often lost in translation. It's more efficient to speak to the LaserWriter in its native language, which is just what PostScript graphics programs do. These programs also provide a *front end* to versatile PostScript commands that produce effects impossible in QuickDraw, such as hairlines, compound objects made up of lines and curves, gradient fills from one gray to another, and precise rotation of text and graphics. These programs also perform a valuable service to nonprogrammers; although PostScript contains some English-like syntax, it more closely resembles FORTH. (PostScript trivia buffs might be interested to know that PostScript is so named because, like FORTH, it uses *Postfix notation,* in which operators follow operands.)

For further information on PostScript, see "Getting Started with Postscript" in the December 1987 issue of *Macworld.* Now let's look at the three programs.



JOHN HERSEY

Cricket Draw

Those accustomed to *MacDraw* or *MacDraft* should have little trouble making the transition to Cricket Software's *Cricket Draw.* The program offers familiar tools such as line, rectangle, and oval, and the methods for drawing, moving, and resizing objects are comparable to those of *MacDraw* (see Figure 1). But unlike *MacDraw, Cricket Draw* takes advantage of many of PostScript's capabilities. For example, you can rotate text or objects in 1-degree increments, viewing a readout of the angle of rotation as you do so. You can fill shapes with linear, logarithmic, or radial *fountains,* smooth transitions from one gray to another. While a fountain effect can be attained in *Illustrator* by layering shapes of different shades, *Cricket Draw* produces gradient fills automatically.

Cricket Draw's text-handling capabilities are impressive: the program lets you mix fonts and styles in a single block of text. In addition, a special command lets you *bind* text to a curving shape or line. In the text-effects department, *Cricket Draw* has *Illustrator* beat in many respects.

Finally, *Cricket Draw*'s *transfer modes* let you create dot or line screens for printing halftones or creating color separations. Unfortunately, this capability isn't mentioned in the manual. You have to refer to the semiannual technical notes that are sent to registered *Cricket Draw* owners, or find out for yourself by word of mouth or by accident (to access *Cricket Draw*'s transfer modes, hold down the Option key and click the object fill control box in the lower-left corner of the screen).

Why choose *Cricket Draw?* Graphic designer John Odam uses both *Cricket Draw* and *Illustrator,* and finds *Cricket Draw* more appropriate for sketches and illustrations that he wants to produce quickly. "With *Illustrator,*" he says, "you must have a firm idea of what you want before drawing; *Cricket Draw* is better for freehand drawing." In Odam's opinion, "*Illustrator* is designed with the professional in mind, while *Cricket Draw* is for both professionals and amateurs." His main complaint about *Cricket Draw* is its inability to combine lines and curves into a compound object.

Designer Michael Singleton also uses both *Illustrator* and *Cricket Draw.* He considers *Cricket Draw* an extension of *MacDraw,* with added features for graphic artists. Singleton cites *Cricket Draw*'s text capabilities and ability to display angles and coordinates as pluses over *Illustrator,* but found the program's curve-handling limited. In addition, he found little use for some of *Cricket Draw*'s tools, such as the starburst and the diamond. He finds *Cricket Draw* appropriate for projects such as organization charts and schedules, pointing out that the grate tool is excellent for creating tables and other forms with parallel lines.

I talked to several more users, and the consensus was that *Cricket Draw* is easy to learn because of its *MacDraw*-like interface, is a good choice for producing freehand drawings that include PostScript special effects, and is accessible to amateurs as well as professional artists. It is also, incidentally, cheaper than either of the other PostScript graphics programs.

P.S. There's More

If you're shopping for a PostScript graphics program, you'll soon have two more contenders to contend with. Both should be available early this year. Aldus Corporation, well known for its *PageMaker* page-layout program, plans to release a PostScript graphics program developed by Altsys. In addition, PS Publishing has announced a graphics program called *Collage*.

A preview of *Collage* at the Seybold Desktop Publishing Conference revealed a program along the lines of *Illustrator,* but with some additional features. Like *Illustrator, Collage* lets you create paths made up of lines and curves. A spline curve tool allows you to add or move points, offering flexible curve editing. Unlike *Illustrator, Collage* will let you use PostScript commands such as scale, skew, and rotate to modify a bit-mapped template once it is pasted in (this feature was not yet implemented at the Seybold conference). Other features include a status bar that displays angles and coordinates; a snap-to grid; units of measurement including points, picas, inches, and centimeters; the ability to hide layers; and color display and printing.

Aldus's program, code-named MasterPiece at the time of this writing, will offer many of the same features as *Collage,* including a freehand drawing tool to draw or trace images; PostScript effects such as scale, skew, and rotate; rulers; a snap-to grid; layers; an information bar; color capabilities; and the ability to break a shape into its component curve segments. Special features include gradient fills; eight levels of Undo and Redo; the ability to edit a drawing in Preview mode; and clipping paths, or *friskets.* An invaluable feature allows you to make graphic style sheets and templates, maintaining consistency from one publication to the next. MasterPiece looks strong in the area of text manipulation as well. Text attributes include binding text to a path, multiple fonts and styles in a block of text, gradient fills, and automatic or manual kerning.

Both of these programs look promising, but no matter how good a PostScript graphics program is, converting a bit-mapped image to a PostScript outline is still a time- and labor-intensive task. Wouldn't it be nice if a program could automatically trace a template for you? This wishful thinking isn't as far-fetched as it sounds. Soon we'll see *scan conversion* programs, miraculous applications that do much of the dirty work of tracing a bit-mapped image. Now, if someone would just come up with a utility that cleaned up those images and added fill patterns, all you graphic artists could simply write a few macros and then take that long-overdue vacation.

Adobe Illustrator

Illustrator is usually viewed as a program for professional artists and designers. Although some artists use *Illustrator* as a freehand drawing tool, most use it to convert images from other media into crisp, clean PostScript artwork (see Figure 2).

Generally speaking, you use *Illustrator* as follows. First, an image *template* is created and pasted into *Illustrator.* The original image can be a pen or pencil drawing converted to a bit-mapped image by a scanner, a scanned version of a photo, or artwork created with a Mac graphics program such as *SuperPaint* or *MacDraw.* The template is displayed in gray so as not to obscure the next part of the process, in which you trace the image with *Illustrator*'s pen tool, which produces straight lines and *bezier curves.* A series of curve segments make up a *path* in *Illustrator* terminology.

Precise curve-manipulation is one of *Illustrator*'s strong points. Once you draw a path, you can reshape it by dragging *anchor points* (the points at the beginning and end of a curve) and *direction points* (points that determine the curve's shape). A path can be edited at any time; you can move or add anchor points, drag direction points, or delete segments to position the path over the template precisely. A closed path, or shape, can be filled with black, white, or a gray scale. Shapes are stacked one on top of another to build complex, multishaded illustrations.

Michael Singleton uses *Illustrator* to create maps—scanning an image, tracing it, and adding text and other details. "It's the first program that's given me the capability to produce really good-looking graphics on the LaserWriter and the Linotronic 300," he comments. Singleton praises *Illustrator*'s ability to produce two curved paths precisely parallel to one another. To accomplish this, he draws the first object with, say, a 2-point line width, copies it and pastes the copy over the original, and sets the second path to a 1-point white line. The result is two parallel ½-point-wide curves. Singleton's wish list for *Illustrator* includes a display of angles and coordinates, rulers

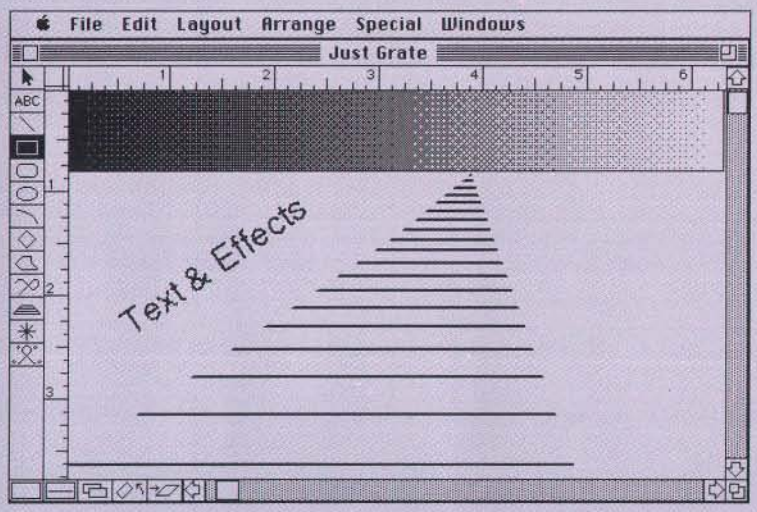
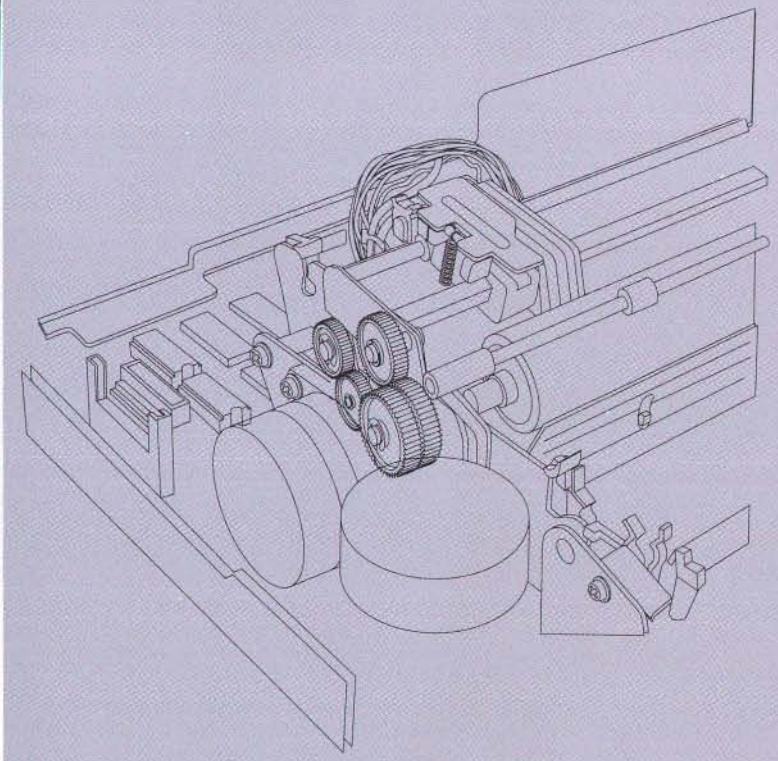




Figure 1
Cricket Draw*'s forte is PostScript special effects. Combine the program's drawing tools with effects such as gradient fills and rotation in 1-degree increments to create anything from a simple organization chart to an intricate illustration. The highly shaded image of a camera (right) was created by Novus Graphics, a graphic arts firm based in Monroeville, Pennsylvania.*



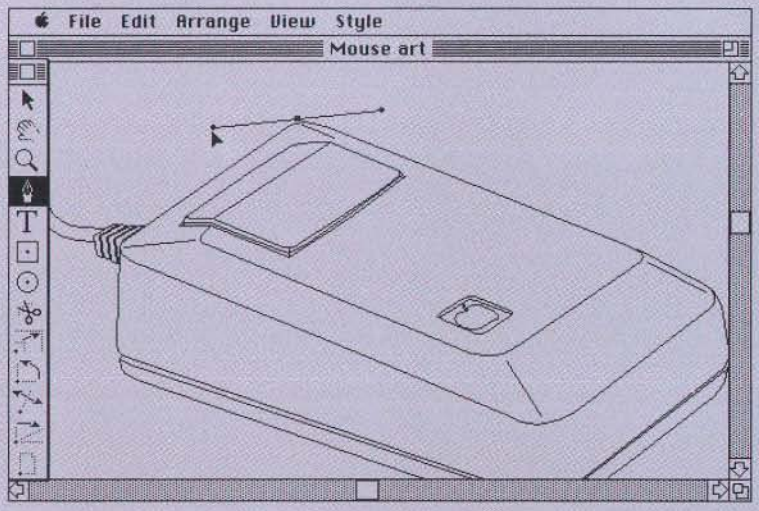


Figure 2
Illustrator *offers precise control of bezier curves. The program's ability to combine lines and curves into complex shapes, coupled with control of line weight and fill patterns, lets professional artists and illustrators take full advantage of PostScript. Jeffery West used* Adobe Illustrator *to create the detailed technical drawing on the left for Apple Computer.*

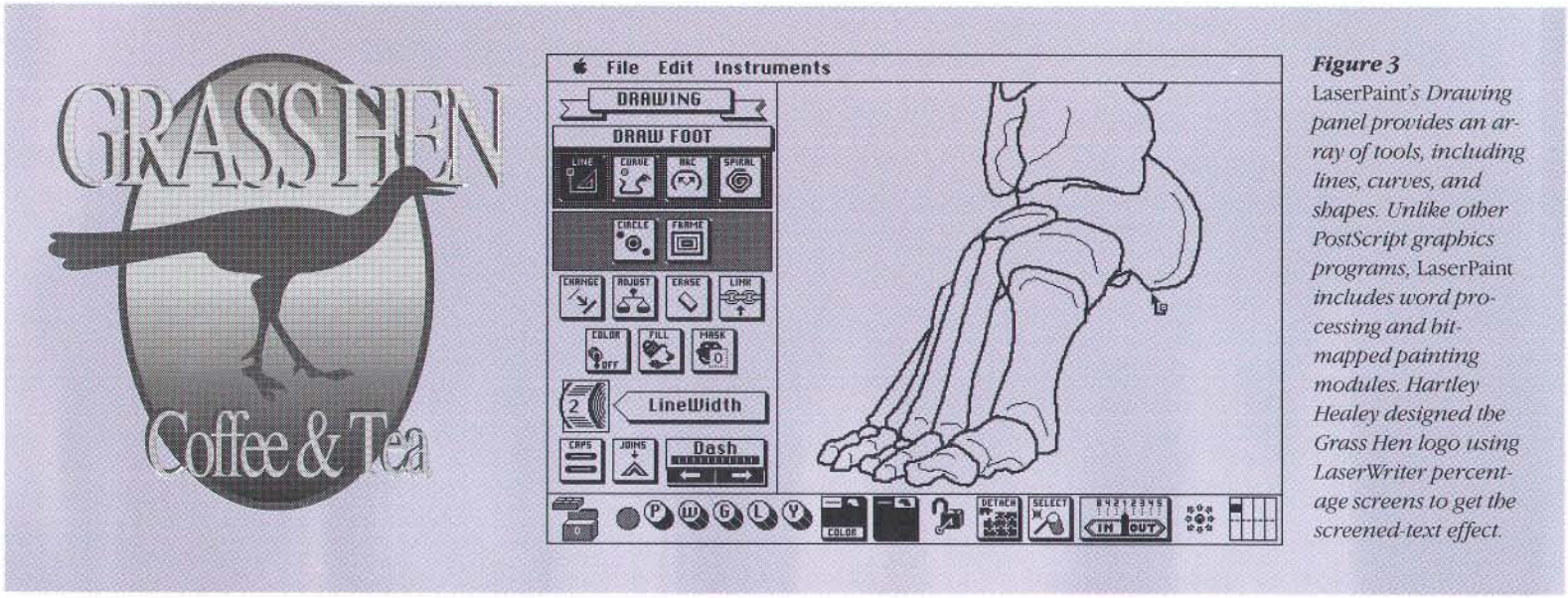


Figure 3
LaserPaint's *Drawing panel provides an array of tools, including lines, curves, and shapes. Unlike other PostScript graphics programs,* LaserPaint *includes word processing and bit-mapped painting modules. Hartley Healey designed the Grass Hen logo using LaserWriter percentage screens to get the screened-text effect.*

not limited to picas and points, better control of layers, and the ability to edit the template.

Jeffery West finds *Illustrator* the ideal tool for technical illustrations. He converted from the traditional method of drawing on vellum with pen and ink to the clean lines of *Illustrator.* West finds that *Illustrator* doesn't drastically speed the drawing process–he still has to draw a sketch, scan it in, and trace it–but the program has other advantages that save time and avoid tedium. For example, if a drawing contains multiple versions of the same element, he can draw one element and copy it–scaling, rotating, or otherwise altering it if necessary. In addition, an *Illustrator* drawing can be easily edited. If he needs to change a line weight or a shade, he can quickly accomplish the change. If a client wishes to make changes, West can usually edit the original drawing rather than starting over. West also appreciates *Illustrator*'s ability to scale a drawing without altering line weights. His only complaint is that the Mac's screen resolution isn't accurate enough to gauge details, forcing him to print numerous proofs.

Newsletter publisher Robert Eckhardt used *Illustrator* to create the two-line title for his newsletter masthead. He had difficulty making the two lines of type the same length; text that lines up on the screen does not necessarily line up on the LaserWriter. He finally made a series of minute adjustments and printed successive proofs on the LaserWriter. He found it more efficient to do five or six experiments on a single page and then print an entire page of adjustments, rather than print one experiment at a time. Although he initially had some difficulty learning to edit *Illustrator*'s bezier curves, once he became proficient with the program Eckhardt was pleased with the way he could use one hand for keyboard commands and the other for the mouse, without interrupting his work to select tools.

The consensus? *Illustrator* is an appropriate tool for professional artists, graphic designers, and technical illustrators. It is not as easy to learn and use as *Cricket Draw;* beginners may have trouble wrestling with bezier curves at first. But most users seem to agree that once *Illustrator* is mastered, it enables them to take advantage of most of PostScript's talents to create high-quality artwork.

LaserPaint

The newest arrival in the PostScript graphics arena is LaserWare's *LaserPaint.* This unusual program is really five mini-programs rolled into one: drawing, bit-mapped painting, text, PostScript effects, and printing specifications. Each of the program segments is housed in its own panel; click a button to move from one panel to another. We'll focus on *LaserPaint*'s PostScript capabilities, which straddle several of its panels.

LaserPaint offers many of the tools and effects found in *Cricket Draw* and *Illustrator.* The program's Drawing panel provides tools such as a curve, line, arc, circle, and rectangle, as well as fill patterns and masks. Line width is determined by a


ROBERT HOLMGREN

Technical illustrator Jeffery West uses Illustrator *to modify drawings once he has created the original images using traditional techniques.*

PostScript Clip Art

It's not surprising that purveyors of computerized clip art now provide illustrations in PostScript format. In the past few months four companies have announced clip-art collections that include images created with *Cricket Draw* and *Illustrator.*

Olduvai Software, a newcomer to the Mac marketplace, offers the *Post-Art* collection, a three-disk set of images in *MacDraw, Cricket Draw,* and *Illustrator* format. Subject matter includes human figures, animals, and abstract designs. *Post-Art* seems to be intended more as Art than as clip art, however (each drawing is signed by the artist, which is uncommon in the generic world of mass-produced art). Most of the drawings would not be suitable for embellishing invitations, newsletters, and the like.



Olduvai Software

Studio Advertising Art offers *Click & Clip,* a collection of illustrations in *Illustrator* or EPS format. Subject areas include seasons, borders, business, and sports. *Click & Clip* includes two disks of artwork and an image catalog for $39.95, four disks for $67.00, or eight disks for $124.50.

Image Club Graphics, a Canadian company that already offers Mac clip art in *MacDraw* format, has announced *Digit-Art Laser Graphics Volume 3,* a five-disk set of graphics in EPS format. The set includes approximately 150 images in categories such as business, sports, entertainment, and travel, and sells for $149.



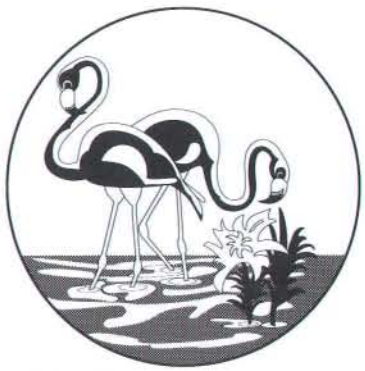
Image Club Graphics

Mac old-timers may remember that T/Maker came out with some of the first Macintosh software in 1984: a disk of *MacPaint* clip-art images. Their latest clip-art offering is *ClickArt EPS Images Volume I,* which includes more than 125 images in EPS (Encapsulated PostScript) format. Files saved in this format can be opened by *Illustrator* or *Cricket Draw,* as well as a number of page-layout programs. The illustrations span numerous subject areas–including entertainment, publishing, animals, and transportation–and sell for $129.95.



T/Maker

Last, but by no means least, is a collection from Multi-Ad Services, a leading distributor of advertising art. Multi-Ad's Kwikee Inhouse Graphics Services offers subscribers more than 75 images a month on CD ROM disks. Many of the graphics are produced with *Illustrator.* A subscription to the service costs $200 a month, plus $25 for each Mac workstation. In addition to providing generic graphics, Inhouse Graphic Services also creates custom logos and artwork with *Illustrator* for customers with specialized needs. (For more information on Multi-Ad's graphics services, see *Macworld News,* July 1987.)

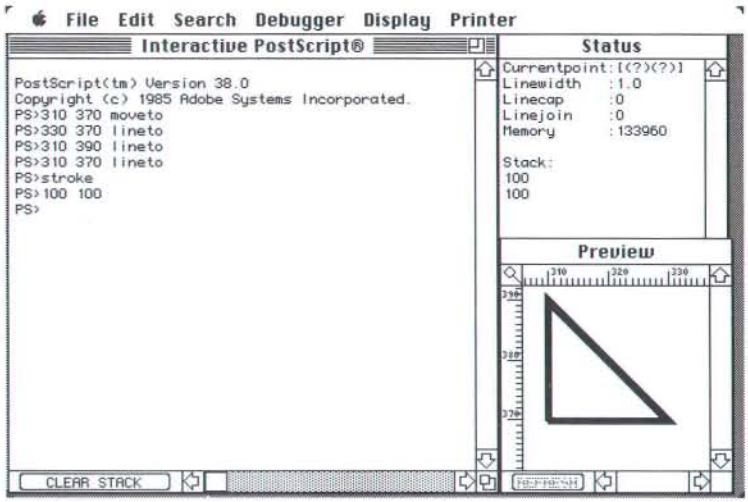


Multi-Ad Services

Follow the Yellow Brick Code

PostScript programmers take heart! *LaserTalk,* a new PostScript development system from Emerald City Software, gives you access to the interpreter in the LaserWriter or other PostScript printers. *LaserTalk* links a Mac Plus, SE, or II to the printer's PostScript interpreter via AppleTalk; as you type commands, you see them executed in an interactive PostScript window. *LaserTalk*'s status window displays the state of PostScript variables and stacks after each line is sent to the printer. In addition, a preview window shows what will be printed, freeing you from printing proofs each time you alter your program.

LaserTalk's editor includes Undo, Search and Replace, and Clipboard support. An interactive debugger provides tracing, stepping, and breakpointing, with line-by-line error detection and status updates. The system includes help features as well. A dictionary browser shows you all loaded dictionaries and procedures, and PostScript operators are defined with excerpts from Addison-Wesley's *PostScript Language Reference Manual.* PostScript is a bona fide programming language. It's high time it had a development system.



unique thumbwheel control, and different styles of caps and joins can be selected by clicking an icon (see Figure 3).

Enter the Goodies panel to access PostScript effects such as rotate, skew, mirror, scale, and gradient fill. So far, *LaserPaint* sounds quite similar to the other PostScript programs. Unlike the others, however, *LaserPaint*'s drawing area spans eight pages. Another of the program's strong points is its text handling. Like *Cricket Draw, LaserPaint* lets you bind text to a path, assign a pattern to text, and mix fonts and styles in a block of text. But *LaserPaint*'s text module is more akin to a word processor or page-layout program than to the text functions you'd expect in a graphics program. The Writing panel offers features such as multiple columns, justification, and leading and kerning adjustment.

The Writing panel also operates in conjunction with the Drawing panel's masks to fill a shape with text or wrap text around a shape.

Finally, the Laser panel includes printing features such as registration marks, trim and fold marks, and color separations. A clip option lets you print outside the normal print area.

Graphic designer Joseph Maas chose *LaserPaint* over *Illustrator* in part because of *LaserPaint*'s text-wrap and gradient-fill features. He finds the program adequate for most of his work, but claims it's awkward for precision work. He also finds it difficult to align a drawing precisely in the center of a page, with an even border all the way around.

Charles Scholdt, director of Weather Central, a weather forecasting service that provides weather maps to a number of newspapers, is another *LaserPaint* user. He chose the program because of its text-wrap and color-separation features, both of which facilitate the production of Weather Central's maps, which were formerly produced with *MacDraw.*

Although *LaserPaint* is long on features, it's not perfect. Almost every user I talked with complained about the program's unorthodox user interface and its poor documentation. *LaserPaint* deviates from Mac interface conventions in several respects, from iconography to the way tools operate. (One unkind critic referred to "the interface from Mars.") On the other hand, most *LaserPaint* users spoke highly of LaserWare's prompt replies to questions and willingness to implement users' suggestions.

Buying Decisions

So what's the bottom line? Generally speaking, *Cricket Draw* is a good choice for those who want easy access to Post-

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Doug Clapp's Word Tools ..... 42.
Affinity Microsystems ... NCP
Tempo *(power user's macro utility)* ..... 54.
Allan Bonadio Associates ... NCP
Expressionist *(equation processor)* ..... 52.
ALSoft ... NCP
DiskExpress *(maximize disk performance)* 26.
Font/DA Juggler ..... 26.
Altsys ... NCP
FONTastic Plus *(advanced font editor)* .... 48.
Fontographer *(LaserWriter font editor)* ... 243.
Ann Arbor ... NCP
FullPaint *(advanced Paint program)* ..... 49.



Borland International ... NCP
Reflex Plus—High-powered relational database. Features built-in number crunching and extensive sorting ..... $165.

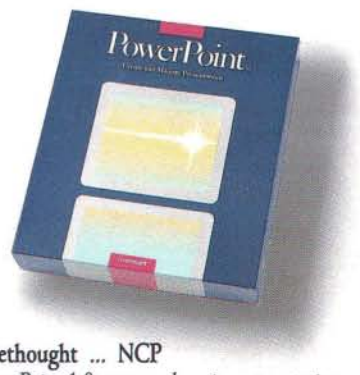
Ashton-Tate ... NCP
dBASE Mac 1.0 *(relational, req. MacPlus)* 299.
Batteries Included ... NCP
Thunder! 1.23 *(spelling checker)* ..... 31.
Battery Pak *(9 desk accessories)* ..... 31.
Isgur Portfolio *(portfolio management)* ... 129.
Berkeley System Design ... NCP
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Blyth ... NCP
Omnis 3 Plus *(database generator)* ..... call
Omnis 3 Plus *(2-5 users)* ..... call
Omnis 3 Plus *(6-10 users)* ..... call
Bogas Productions ... NCP
Studio Session *(music creation)* ..... 57.
Heavy Metal Rock Disk ..... 15.
Country Disk ..... 15.
Borland International ... NCP
Turbo Pascal Tutor ..... 49.
Numerical Methods Toolbox ..... 59.
Sidekick 2.0 *(includes MacPlan)* ..... 59.
Turbo Pascal *(HFS compatible)* ..... 59.
Reflex *(while supplies last)* ..... 59.
Reflex Plus *(info management tool)* ..... 165.
BrainPower ... NCP
Thinkfast *(memory improvement)* ..... 23.



BrainPower ... NCP
StatView 512+—Professional data analysis package. Includes multivariate and factor analyses, graphics, and more ..... $178.

StatView *(statistics package)* ..... 34.
Graphidex *(DA graphics organizer)* ..... 65.
DesignScope *(electronic circuit design)* .. 128.
MathView Professional *(num. analysis)* ... 149.
StatView 512+ *(req. external drive, 512k)* ... 178.
Bravo Technologies ... NCP
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Broderbund ... CP
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Geometry *(over 350 problems!)* ..... 63.
Physics *(over 300 problems)* ..... 63.
CAMDE ... NCP
Nutricalc *(diet & nutrition analysis)* ..... 49.
Nutricalc Plus *(full-featured)* ..... 175.
CasadyWare ... NCP
Fluent Fonts *(two-disk set)* ..... 28.
Fluent Laser Fonts *(Vols. 1-15)* ..... *each* 46.
CE Software ... NCP
Calendar Maker *(create custom calendars)* 27.
Disktop 3.0 *(powerful DA Finder)* ..... 32.
QuicKeys *(reduce mouse movements)* .... 69.
Challenger Software ... NCP
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Chang Labs ... NCP
Rags to Riches Ledger ..... 123.
Rags to Riches Payables ..... 123.
Rags to Riches Receivables ..... 123.
Rags to Riches Three Pak ..... 299.
The C.A.T. *(contacts, activities, time)* ..... 239.
Inventory Control ..... 239.
Professional Billing ..... 239.
Professional Three-Pak ..... 389.
Retail Business 3 Pak ..... 389.
Concept Development
MicroKitchen Companion ..... 29.
America Cooks: American, Chinese, French, Italian or Mexican ..... *each* 11.
Cortland ... CP
TopDesk 2.3 *(7 new desk accessories)* .... 33.
Cricket Software ... NCP
Statworks *(statistical package)* ..... 75.
Pictograph *(color on the Mac II)* ..... 105.
Cricket Graph *(multiple windows)* ..... 124.
Cricket Draw *(advanced draw capabilities)* 175.
Data Tailor ... NCP
Trapeze *(spreadsheet, reqs. 512k)* ..... 159.
DataViz ... NCP
MacLink Plus *(transfer Mac/IBM data)* .... 149.

Davidson ... CP
Math Blaster! *(grades 1-6)* ..... $27.
Deneba Software ... NCP
Merriam-Webster's Thesaurus ..... 36.
Comment *(electronic Post-It notes)* ..... 59.
Canvas 1.0 *(includes desk accessory)* .... 119.
Digital, etc. ... NCP
Turbo Maccountant *(GL,AP,AR,Payroll)* ... 255.
Dove Computer ... NCP
RAMSnap *(RAM Disk/Disk Cache)* ..... 22.
Dow Jones ... CP
Straight Talk ..... 59.
Market Manager Plus ..... 159.
Dubl-Click Software ... NCP
Calculator Construction Set ..... 37.
World-Class Fonts! *(both volumes)* ..... 47.
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Deluxe Music Construction Set 2.0 ..... 62.
Enabling Technologies ... NCP
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Pro 3D *(3D shaded modeling)* ..... 199.
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Japanese Clip Art Scroll 1 "Heaven" ..... 59.
Japanese Clip Art Scroll 2 "Earth" ..... 59.
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Fifth Generation Systems ... NCP
FastBack Mac *(powerful backup utility)* .... 59.
1st Byte ... CP
Mad Libs *(party time)* ..... 14.
First Shapes *(all about sizes & shapes)* .... 32.
Kid Talk *("talking notebook")* ..... 32.
Math Talk *(math learning tool)* ..... 32.
Smooth Talker *(speech synthesis)* ..... 32.
Speller Bee *(spelling learning tool)* ..... 32.
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FileMaker 1.0 *(custom design reports)* ..... 49.
PowerPoint 1.0 *(presentations)* ..... 189.
Foundation Publishing ... NCP
Comic People *(create your own characters)* 26.
Comic Strip Factory *(create cartoons)* ..... 45.
FWB Software ... NCP
Hard Disk Backup ..... 37.
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Hayden Software ... CP
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Score Improvement for the ACT ..... 58.

Ideaform ... NCP
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Smart Alarms *(DA reminder system)* ..... 37.
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LaserServe *(network software)* ..... 64.
ComServe *(NCP, modem sharer)*..... 124.
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Graphic Accents *(250 illustrations)*..... 29.
Professional Type Fonts for Text..... 29.

LaserWare ... CP
LaserWorks *(requires 512k, LaserWriter)*... 195.
LaserPaint *(requires Mac Plus)*..... 315.

Layered ... CP
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Ready,Set,Go!3 or Word ..... *each* 41.

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WillWriter 2.0 *(prepare your own will)* ..... $30.

Letraset ... NCP
Ready,Set,Go! 4.0 *(page layout)* ..... 289.

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MacHieroglyphics, MacKana/Basic Kanji,
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MacThai, SuperGreek, MacHebrew
MacAkkadian..... *each* 59.
SuperGreek New or Old Testament..... 79.
MacHebrew Old Testament..... 79.
LaserFrench/German/Spanish ..... 79.
LaserGreek, LaserHebrew ..... *each* 79.
Laser Transliterator..... 79.
LaserTech ..... 79.
MacGreek/Hebrew/Phonetics..... 89.
LaserCyrillic, MacChinese ..... *each* 115.

Living Videotext ... NCP
More 1.1C *(outlines, windows, & tree charts)* 149.

Lundeen & Associates ... NCP
WorksPlus Spell 1.1 ..... 49.

MacroMind ... NCP
VideoWorks II *(animation tool)* ..... 119.

MacroPac International ... NCP
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McPic Vol. 1 or Vol. 2 ..... 29.
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The Slide Show Magician 1.3 ..... 35.

Micro Analyst ... NCP
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Microsoft ... NCP
Flight Simulator *(the Mac takes flight, CP)* .. 32.
Basic Interpreter 3.0..... 62.
Chart 1.02 *(42 chart styles, CP)*..... 72.
Multiplan 1.1..... 110.
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GraphicWorks 1.1 *(newsletters)*..... 87.

MindWork Software ... NCP
MindWrite 1.1..... 169.

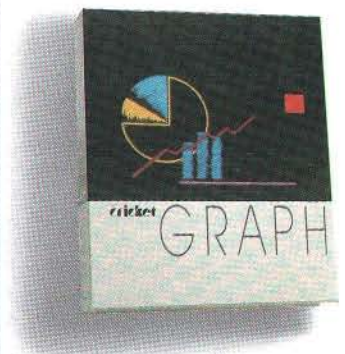
Monogram ... NCP
Forecast *(tax planning)*..... 40.
Dollars & Sense *(home, small business)*.... 81.

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McMax *(dBASE III compatible)* ..... 189.

Nashoba Systems ... NCP
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Odesta ... NCP
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Multi-User Helix *(requires 512k)*..... 429.

Olduvai Software ... NCP
DA-Switcher *(unlimited desk accessories)* .. 26.



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ipt effects for freehand drawing, creat- charts and forms, or adding graphic ches to ads, newsletters, and other sktop publications. *Cricket Draw*'s abili- to combine fonts and styles in a single ck of text and automatically create gra- nt fills are not found in *Illustrator*. *icket Draw* has the lowest price tag and most accessible interface of the three grams, but it lacks the ability to com- e curves and straight lines into com- und shapes.

Illustrator is not for the casual user. mpared to *Cricket Draw,* the program a steep learning curve, as it were, but it ers professional artists precise control r curved shapes. *Illustrator* excels at nverting scanned images into PostScript. me artists use *Illustrator* for freehand wing, but most find that too much plan- g is necessary to make the program ef- tive for drawing from scratch. If you end to purchase *Illustrator,* keep in nd that you'll need a scanner and possi- a paint program as well.

LaserPaint is for artists or publishers o prefer the integrated approach. Draw- , painting, text, and printing options ound, but bear in mind that you'll en- unter a nonstandard interface. This pro- am might be appropriate for those who nt to work with text and graphics in the me document and don't mind learning ny modules.

If you're still undecided, Table 1 will lp you compare the features of the three grams. Before deciding what to buy, efully assess which PostScript effects are sential for the graphics you want to pro- ce. Do you want to draw freehand illus- tions or convert scanned images into stScript? Will you concentrate on illustra- ns, or frequently combine text and aphics? You should also consider how uch time and money you're willing to in- st, and whether you'll need auxiliary uipment such as a LaserWriter or a scan- r. Although *Cricket Draw, Illustrator,* d *LaserPaint* differ in their approaches PostScript graphics, the three programs ve one thing in common: they give ar- ts access to a programming language de- gned to produce art. □

e *Where to Buy* for product details.

The PostScript Lineup

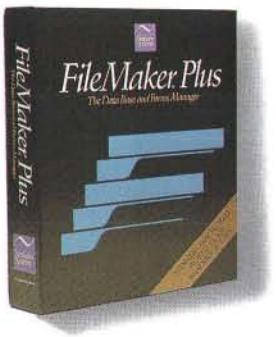
Tools	Cricket Draw	Illustrator	LaserPaint
Curve, straight line	●	●	●
Freehand drawing	●		
Polygon	●	●	●
Starburst	●		
Arc	●		●
Parallel lines (grate)	●		
Dotted/dashed lines	9 styles	adjustable	adjustable
Compound shapes (lines + curves)		●	●
Tools auto-scroll	●	●	●
Shapes			
Rectangle, oval	●	●	●
Rounded-corner rectangle	●		●
Diamond	●		
Adjustments			
Align objects	●		
Grid snap	●		●
Rulers	in., cm, picas, pixels	points, picas	in., cm, picas, pixels
Grouping	●	●	●
Locking	●	●	●
Zoom	7 levels	9 levels	7 levels
Display dimensions, angles	●		●
Line caps, joins		●	●
Customize tool palette			●
Effects			
Gradient fill (fountain)	●		●
Shadow	●		
Rotate by degree	●	●	●
Halftone screens	●		●
Text			
Bind to path	●		●
Mix fonts, styles, sizes in block	●		●
Adjust leading		●	●
Adjust kerning		●	●
Wrap around object			●
Data Transfer			
Export	EPS, PICT, PS code	EPS, PS code	EPS, PS code, TIFF
Import	MacDraw[1], PICT	MacPaint, PICT	MacPaint, PICT, TIFF
Edit PostScript code	●		
General			
Version	1.0	1.1	1.1
Requires	512K	Mac Plus	Mac Plus
Copy protection	none	key disk[2]	key disk[3]
Price	$295	$495	$495

[1]According to a Cricket Software representative, version 1.1 will also import *Illustrator* files in EPS format.

[2]A non-copy-protected program disk is sent to owners who send in their registration cards.

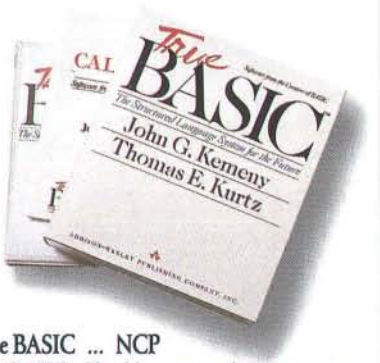
[3]According to a LaserWare representative, copy protection will be removed in the next version.

Latest versions.



Nashoba Systems ... NCP
FileMaker Plus—Outstanding forms and database management program. Performs calculations, mail mergings, etc..... $149.

HD Backup *(supports MFS, HFS)* ..... 28.
Personal Computer Peripherals ... NCP
HFS Backup ..... 29.
ProVUE Development ... NCP
OverVUE 2.1 *(power-packed database)*... 149.
Rubicon Publishing ... CP
Dinner At Eight-Silver Palate Bundle ..... 51.
Satori ... NCP
BulkMailer 3.0 *(mailing lists)* ..... 82.
BulkMailer Plus *(up to 90,000 names)* .... 199.
Legal Billing *(attorneys to accountants)* ... 379.
Legal Billing II *(full trust accounting)*..... 569.
Project Billing *(architects to engineers)*.... 442.
Silicon Beach Software ... NCP
Silicon Press *(printer utility, 512k)* ..... 41.
SuperPaint *(advanced graphics program)*.. 79.
Simon & Schuster ... NCP
Mac Art Department *(req. Paint program)* .. 24.
Typing Tutor IV *(new & improved)*..... 35.
SoftStyle ... NCP
Epstart *(Epson printer driver)*..... 27.
Printworks *(print faster & in color)*..... 46.
Laserstart *(Hewlett-Packard Laserjet)*..... 58.
Softview ... NCP
Macinuse *(time-use manager)*..... 42.
Software Discoveries ... NCP
Record Holder Plus *(data manager)* ..... 45.
Software Supply ... NCP
Suitcase *(font and DA utility)* ..... 38.
PowerStation *(alternative to Finder)* ..... 38.
Software Ventures ... NCP
Microphone 1.1 *(includes Glue™)*..... 119.
Solutions, Inc. ... NCP
SmartScrap & The Clipper ..... 40.
Glue *(creates "print to disk" capability)* .... 40.
SuperGlue *(total graphic integration)* ..... 57.
Springboard ... CP
Art a la Mac Volume 1 *(NCP)*..... 23.
Art a la Mac Volume 2 *(NCP)*..... 23.
Early Games or Easy as ABC ..... 28.
Certificate Maker *(requires 512k)*..... 35.
Certificate Library Vol. 1 ..... 19.
SuperMac Software ... NCP
SuperSpool 3.4 ..... 45.
Diskfit *(backup & restore utility)* ..... 45.
Network Diskfit *(automatic back up)* ..... 205.
Sentinel *(encryption)*..... 85.
SuperLaserSpool ..... 85.
Multi-User SuperLaserSpool ..... $205.
Survivor Software ... NCP
MacMoney *(financial planner)* ..... 41.
Symmetry ... NCP
Acta 2.0 *(outline/writing desk accessory)* ... 37.
PictureBase 1.2 *(clip art manager, 512k)* ... 59.
Think Educational ... CP
MacEdge II *(math & reading)*..... 28.
Mind Over Mac ..... 28.
THINK Technologies ... NCP
HFS Navigator *(search for buried files)*.... 35.
Laserspeed *(LaserWriter utility)* ..... 55.
Lightspeed Pascal..... 65.
Lightspeed C *(top-rated C Compiler)* ..... 95.
CAPP's for Lightspeed C..... 49.
InBox Starter Kit *(CP)* ..... 215.
InBox Personal Connection *(Mac & PC)*... call
T/Maker ... NCP
ClickArt Personal Graphics..... 28.
ClickArt Effects..... 28.
ClickArt Publications..... 28.
ClickArt Letters Vol. 1 or 2..... 28.
ClickArt Holidays ..... 28.
ClickArt Business Image..... 28.

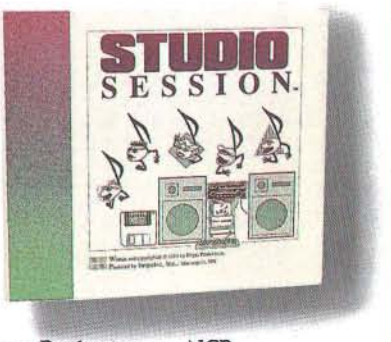


True BASIC ... NCP
True BASIC—Flexible structured programming version of BASIC. Optional programming and educational software libraries available... $59.

Christian Images ..... 35.
Bombay, Plymouth, or Seville Laser font ... 45.
WriteNow *(word processor)* ..... 99.
TML Systems ... NCP
TML Source Code Library ..... 55.
TML Database Toolkit..... 59.
TML Pascal *(compiler, req. 512k)*..... 59.
TOPS ... CP *(formerly Centram Systems)*
TOPS *(file-server/LAN software)* ..... 119.
TOPS PRINT ..... 125.
TOPS for the PC..... 299.
True BASIC ... NCP
PROGRAMMING LIBRARIES
True BASIC *(fast, flexible, & portable)*..... 59.
Runtime *(create stand-alone applications)*.. 59.
3D Graphics ..... 35.
EDUCATIONAL SOFTWARE
Algebra I or II, Pre-calculus, Trigonometry, Discrete Math, Probability, Calculus, Arithmetic & MacFunction ..... *each* 35.
TrueSTAT *(statistics)*..... 58.
Unicorn ... CP
Animal Kingdom *(ages 6-12)*..... 27.
Decimal Dungeon *(math, ages 9 and up)* .. 27.
Fraction Action *(arcade style math game)* $27.
Mac Robots *(pre-school program)*..... 27.
Math Wizard *(math games, ages 5-10)*..... 27.
Read-A-Rama *(reading, ages 5-8)*..... 32.
William & Macias ... NCP
myDiskLabeler *(design & print labels)* ..... 24.
myDiskLabeler w/Color *(req. Imagewriter II)* 32.
myDiskLabeler w/LaserWriter option ..... 35.
216 Smart Labels *(for Imagewriter)*..... 15.
216 Laser Labels *(for LaserWriter)* ..... 19.
Working Software ... NCP
Lookup *(90,000 word dictionary)*..... 29.
Findswell *(locate documents fast)* ..... 32.
Spellswell *(spelling checker)* ..... 42.
Spellswell Legal or Medical Dictionary.... 57.

GAMES

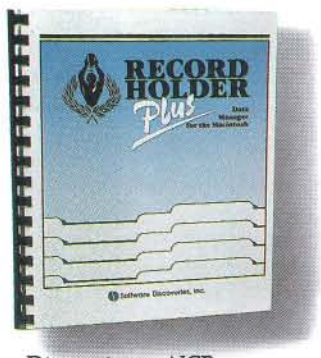
Accolade ... CP
Hardball *(baseball simulation)* ..... 23.
Activision ... CP
Championship Star League Baseball..... 15.
Tass Times in Tonetown ..... 21.
Shanghai *(Mah Jongg strategy)*..... 24.
Portal *(sci-fi novel)* ..... 30.
Addison-Wesley ... CP
Puppy Love *(your dog will love it!)*..... 19.
Ann Arbor
Grid Wars *(3D arcade)*..... 22.
Avalon Hill ... CP
MacPro Football *(req. 512k)*..... 29.
MacPro Football 85 Team or Season ..... 16.
Baudville ... CP
Guitar Wizard ..... 22.
Ted Bear's Rainy Day Games..... 22.
Blue Chip ... CP
Millionaire or Tycoon ..... 35.
Squire or Baron..... 35.
Broderbund Software ... CP
Lode Runner *(over 150 levels)* ..... 24.
Ultima III *(fantasy adventure)* ..... 24.
Ancient Art of War *(military strategy)*..... 27.
Toy Shop *(create working models)* ..... 31.
Bullseye ... CP
Ferrari Grand Prix *(Formula One racing)*... 33.
Fokker TriPlane Flight Simulator..... 33.
Electronic Arts ... CP
Ogre *(tank simulation)* ..... 20.



Bogas Productions ... NCP
Studio Session—MacUser 1986 Music Product of the Year. Includes Editor and Player. Excellent manual ..... $57.

Toll-free support.

Patton vs Rommel . . . . . $27.
Skyfox, Seven Cities of Gold,
Archon, Pinball Construction Set,
Dr J vs Larry Bird . . . . . *each* 27.
Chessmaster 2000 . . . . . 29.
Epyx ... CP
Rogue *(strategy dungeon classic!)* . . . . . 15.
Sub Battle Simulator *(NCP)* . . . . . 24.
Winter Games *(Olympic events)* . . . . . 24.
Great Wave Software ... NCP
LOC *(strategy game)* . . . . . 29.
Hayden Software ... CP
Perplexx *(scrabble-type game)* . . . . . 24.
Sargon III *(9 levels of chess)* . . . . . 29.
Infinity Software ... CP
Go *(4000-year-old strategy game)* . . . . . 22.
Grand Slam *(tennis, req. 512k)* . . . . . 27.



Software Discoveries ... NCP
Record Holder Plus—Flexible, easy-to-use database manager. Search or sort on any field . . . . . $45.

Infocom ... CP
Hitchhiker's Guide to the Galaxy . . . . . 18.
Leather Goddesses, Trinity, Moonmist,
Ballyhoo, Bureaucracy, Stationfall, Nord & Bert,
Lurking Horror, Plundered Hearts,
Hollywood Hyjinx *(standard)* . . . . . *each* 24.
Spellbreaker . . . . . 24.
Zork Trilogy . . . . . 44.
Invisiclues Hint Booklets *(please specify)* . . . 6.
MacroMind ... NCP
Mazewars+ *(play via modem or network)* . . 31.
Miles Computing ... CP
Harrier Strike Mission or Quintette . . . . . 27.
Down Hill Racer *(3D ski simulation)* . . . . . 27.
Fool's Errand *(solve the puzzles)* . . . . . 27.
Mindscape ... NCP
Balance of Power *(world politics)* . . . . . 30.
King of Chicago *(req. minimum 512E)* . . . $30.
Shadowgate *(castle adventure)* . . . . . 30.
Uninvited *(haunted house adventure)* . . . . 30.
Deja Vu *(murder mystery)* . . . . . 30.
Olduvai Software ... NCP
Maze Survival *(action game)* . . . . . 21.
PBI Software ... CP
Strategic Conquest *(multi-user)* . . . . . 35.
Primera Software ... CP
Smash Hit Racquetball *(top-rated!)* . . . . . 15.
Psion ... CP
Psion Chess *(3D and multi-lingual)* . . . . . 31.
Rainbird ... CP
Pawn *(text-graphics adventure)* . . . . . 27.
Sierra On-Line ... CP
Leisure Suit Larry *(swinging single life)* . . . . 24.
King's Quest I, II or III . . . . . 30.
Space Quest . . . . . 30.
Silicon Beach Software
Airborne! *(CP, the classic!)* . . . . . 20.
Enchanted Scepters *(CP, over 200 scenes)* 21.
Dark Castle *(NCP, arcade action)* . . . . . 27.
World Builder *(NCP, program creator)* . . . . . 41.
Simon & Schuster ... CP
Star Trek—The Kobayashi Adventure . . . . . 24.
Sir-Tech ... CP
Mac Wizardry *(high-rated fantasy)* . . . . . 35.
SPHERE, Inc. ... NCP
Tellstar II *(No. & So. hemispheres, req. 512k)* 15.
GATO *(submarine simulator)* . . . . . 26.
Orbiter *(space shuttle simulation)* . . . . . 26.
XOR ... NCP
NFL Challenge *(be the coach!)* . . . . . 65.

HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.
NOTE: Some hardware items are available in either platinum or beige color. Please specify.

20 Megabyte SCSI Hard Drive . . . . . 529.
45 Megabyte SCSI Hard Drive . . . . . 1039.
Apricorn ... 1 year
ApriCord Mac *(for Mac 512k or Mac Plus)* 75.
AST Research ... 6 months
AST 2000 . . . . . 1395.
AST TurboScan *(300 dpi scanner)* . . . . . 1389.
AST TurboLaser P/S . . . . . 2995.
Curtis Manufacturing ... lifetime
SURGE SUPPRESSORS
Safestrip *(6 outlets)* . . . . . 21.
Diamond *(6 outlets)* . . . . . 29.
Emerald *(6 outlets; 6 ft cord)* . . . . . 36.
Sapphire *(3 outlets; EMI/RFI filtered)* . . . . . 47.
Ruby *(6 outlets; EMI/RFI filtered; 6 ft cord)* $55.
Dove Computer ... 90 days
Toolkit *(clamp torx driver & wrist strap)* . . . . 15.
SCSI Interface/Port . . . . . 125.
MacSnap 524 *(512k to 1 Meg)* . . . . . 139.
MacSnap 524S *(512E to 1 Meg w/SCSI)* . . 239.
MacSnap 548 *(512k to 2 Meg)* . . . . . 369.
MacSnap 548S *(512E to 2 Meg w/SCSI)* . . 469.
MacSnap 2S *(1 Meg to 2.5 Meg)* . . . . . 489.
MacSnap 4S *(1 Meg to 4 Meg)* . . . . . 969.
MacSnap 8S *(for Mac II, to 8 Meg)* . . . . . 1939.
MacSnap Plus 2 *(MacPlus to 2 Meg)* . . . . . 249.
MacSnap Plus 4H *(MacPlus to 4 Meg)* . . . . 969.
Ergotron ... 1 year
Mouse Cleaner 360° . . . . . 15.
MacTilt or MacTilt SE . . . . . 69.
MacTilt *(for large monitor)* . . . . . 89.
MacBuffer 512k . . . . . 329.
MacBuffer 1024k . . . . . 429.
Farallon Computing ... 1 year
PhoneNET-AppleTalk 120 . . . . . 9.
PhoneNET PLUS *(DB-9 or DIN-8)* . . . . . 45.
General Computer
Personal Laser Printer . . . . . 1995.
Hayes ... 2 years
Smartcom II *(communications software)* . . 88.
Smartmodem 1200 . . . . . 299.
Smartmodem 2400 . . . . . 449.
MacPlus 1200 Package . . . . . 399.
MacPlus 2400 Package . . . . . 549.
Kensington ... 1 year
Appletalk Cable Clips or Connectors . . *each* 1.
External Drive Cover . . . . . 8.
Mouseway *(mouse tracking pad)* . . . . . 8.



T/Maker ... NCP
WriteNow—MacUser 1986 Best New Word Processor. Multiple windows & columns, footnotes, & 50,000 word spell checker . . **$99.**

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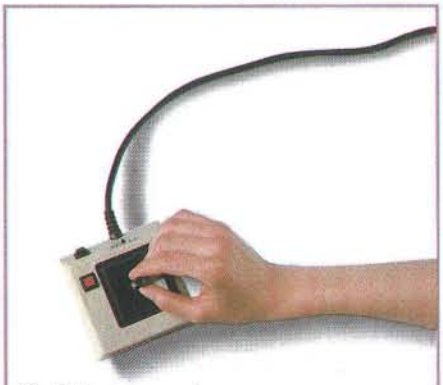
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*Defective software replaced immediately. Defective hardware replaced or repaired at our discretion.

No hidden charges.

Kensington *(continued)*
Mouse Pocket *(for your idle mouse)* . . . . . $8.
Mac Plus/Mac SE Cover . . . . . 9.
Imagewriter II Dust Cover . . . . . 9.
Printer Stand . . . . . 17.
Mouse Cleaning Kit w/Mouse Pocket . . . . . 17.
Disk Drive Cleaning Kit . . . . . 20.
Tilt/Swivel . . . . . 22.
Universal Copy Stand . . . . . 23.
Polarizing Filter or Surge Suppressor . . . . . 34.
Apple Security Kit . . . . . 34.
Printer Muffler *(80 column)* . . . . . 38.
Printer Muffler *(132 column)* . . . . . 51.
Printer Muffler Stand *(80 or 132 column)* . . 25.
A-B Box *(for the Mac Plus)* . . . . . 64.
System Saver Mac or Control Center . . . . . 64.
Turbo Mouse *(for the MacPlus & SE)* . . . . . 83.
Koala Technologies ... 90 days
MacVision *(digitizer, includes MoreVision)* 175.
Kraft Systems ... 1 year
3 Button QuickStick . . . . . 54.
Migent ... 1 year
Pocket Modem *(ext. 300/1200 baud)* . . . . 169.
Mirror Technologies ... 1 year
Magnum 800 External Drive *(platinum)* . . 209.
Magnum Tape 40 Backup . . . . . 1079.
MagNet 30x *(w/cable & print spoolers)* . . 799.
MagNet 40x *(w/cable & print spoolers)* . . 1079.
MagNet 40/40 *(40 Meg, 40 Meg tape)* . . 2139.
MSC Technologies ... lifetime
A+ Mouse *(optical mouse)* . . . . . 79.
Nuvotech ... 1 year
EasyNet *(AppleTalk network connector)* . . . 28.
Orange Micro ... 1 year
Grappler *(universal parallel interface)* . . . . . 69.
Personal Computer Peripherals ... 2 years
MacBottom HD 21 Meg *(SCSI)* . . . . . 749.
MacBottom HD 32 Meg *(SCSI)* . . . . . 899.
MacBottom HD 45 Meg *(SCSI)* . . . . . 1159.
Optional built-in 1200 bps modems avail. call
MacBottom IHD-144 Meg *(for Mac II; 1 yr.)* 2195.
Practical Peripherals ... 5 years
1200 Baud External Modem . . . . . 109.
2400 Baud External Modem . . . . . 189.
SoftStyle ... 90 days
MacEnhancer *(for plotters to printers)* . . . . 159.
Summagraphics ... 90 days
MacTablet 6" x 9" *(sketching)* . . . . . 289.



Kraft Systems ... 1 year
3 Button QuickStick–Cruise across columns, careen around corners, and have more all around fun. Great for games, too! . . . . . $54.

MacTablet 12" x 12" . . . . . $379.
Systems Control ... 2 years
MacGard *(surge protection)* . . . . . 55.
Thunderware ... 90 days
ThunderScan 4.0 with PowerPort . . . . . 199.
Mac II Power Accessory . . . . . 42.
Western Automation
DASCH RAMdisk 2000K . . . . . 399.

DISKS

Double-sided diskettes.
Sony 3½" DS/DD Disks *(box of 10)* . . . . . 18.
MAXELL 3½" DS/DD Disks *(box of 10)* . . . 20.
Fuji 3½" DS/DD Disks *(box of 10)* . . . . . 20.
Verbatim 3½" DS/DD Disks *(box of 10)* . . . 20.
3M 3½" DS/DD Disks *(box of 10)* . . . . . 20.

Single-sided diskettes.
Sony 3½" SS/DD Disks *(box of 10)* . . . . . 13.
Fuji 3½" SS/DD Disks *(box of 10)* . . . . . 13.
MAXELL 3½" SS/DD Disks *(box of 10)* . . . 14.
Verbatim 3½" SS/DD Disks *(box of 10)* . . . 15.
3M 3½" SS/DD Disks *(box of 10)* . . . . . 15.



Dove Computer ... 90 days
MacSnap 548–Increase your Mac 512k's memory to a full 2 Meg. User installable $369.

INFORMATION SERVICES

CompuServe Information Service. . . . . 24.
Dow Jones News/Retrieval Membership Kit 24.

ACCESSORIES

Clean Image Ribbon Co.
Clean Image Ribbon Kit . . . . . 12.
Computer Coverup
External 800k Drive Cover . . . . . 4.
Imagewriter II Cover . . . . . 8.
Mac Plus & Keyboard *(two covers)* . . . . . 10.
I/O Design
Imageware II *(Imagewriter II carry case)* . . . . 45.
Macinware Plus *(Mac Plus carry case)* . . . . . 65.
Macinware SE *(Mac SE carry case)* . . . . . 75.
Macinware SE/Imageware II . . . . . 105.
Available in navy or platinum.
Kalmar Designs
Teakwood Roll-top Case *(holds 45 disks)* . . . 14.
Teakwood Roll-top Case *(holds 90 disks)* . . . 20.
Teakwood Roll-top Case *(holds 135 disks)* . . 28.



Practical Peripherals ... 5 years
External Modems–100 percent Hayes compatible. Feature "automatic adaptive equalization."
1200 bps . . . . . $109.
2400 bps . . . . . $189.

Magnum
Mouse Mover *(let your mouse ride!)* . . . . . 14.
Moustrak
Moustrak Pad *(standard 7" x 9")* . . . . . 8.
Moustrak Pad *(large 9" x 11")* . . . . . 9.
Available in black, blue, brown, gray, green, plum, and red.
Ribbons Unlimited
Imagewriter Ribbons . . . . . 5.
Available colors: black, blue, brown, green, orange, purple, red, yellow and silver.
Rainbow Pack *(6 single color ribbons)* . . . . . 25.
Four Color Ribbon *(requires Imagewriter II)* 11.
Sensible Softworks
Quality "MacAttire" nylon dust covers. . . . 7-17.
High Trek Imagewriter II carry case . . . . . 49.
High Trek Mac SE & ext. kybd. carry case 69.

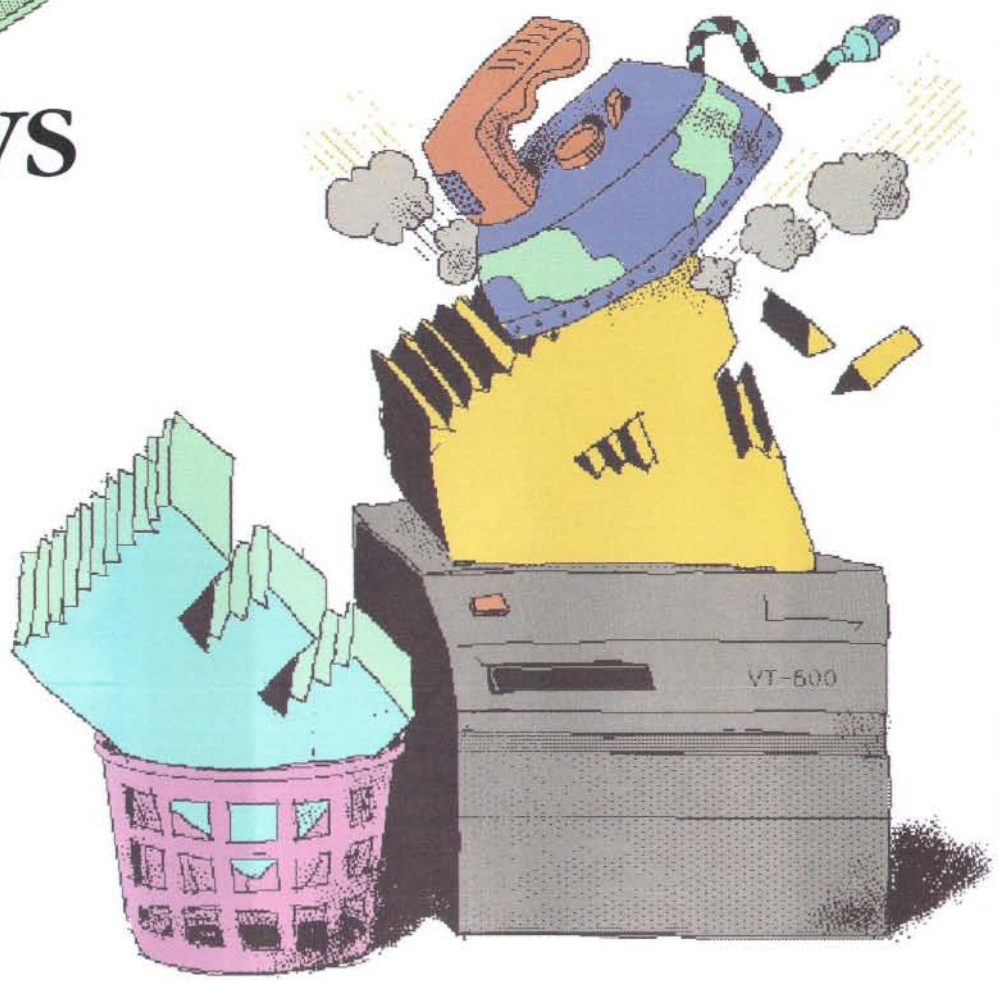
OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
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- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order.
- No sales tax.
- All U.S. shipments insured; no additional charge.
- APO/FPO orders usually shipped 1st Class Mail.
- Allow 1 week for personal and company checks to clear.
- COD max. $1000. Cash or certified check.
- 120 day limited warranty on all products.*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-7711 Monday through Friday 9:00 to 5:30.

SHIPPING

Continental US: Barring massive computer failures and other natural or unnatural catastrophes, all non-C.O.D. orders phoned into MacConnection by 8 PM EST will ship Airborne the same night for next day delivery, except for those within UPS Ground Zone 1 (which is also an overnight service). The total freight charge on any order placed with MacConnection is now $3. Backorders will also ship Airborne overnight at no additional charge. Some areas require an additional day delivery. **Hawaii, Alaska and Outside Continental US:** Call 603/446-7711 for information.

Reviews



Power PostScript Printing

Varityper VT600

Laser printer. ***Pros:*** *Excellent performance and print quality; hard disk for storing fonts.* ***Cons:*** *Expensive; Adobe Times and Helvetica fonts not included.* ***List price:*** *$18,750.* ***Requires:*** *512K, AppleTalk or compatible connectors and cables.*

Wow is likely to be your reaction to the performance of Varityper's VT600 laser printer, which boasts the kind of vital statistics that give desktop publishers goosebumps. It turns out ten pages per minute with 600-dots-per-inch (dpi) resolution (twice as much as most laser printers) under the direction of an Adobe Atlas controller, which contains a 68020 microprocessor running at 16 MHz, 6 megabytes of memory, and a 20MB hard disk.

A hefty 161 pounds, the VT600 outweighs the LaserWriter by 84 pounds and is about the size of a small office copier. It must be set up by a Varityper service representative, who installs the polished drum assembly that transfers toner to paper, fills the toner hopper, and prepares the print mechanism for its maiden voyage.

Interfaces and Typefaces

The VT600 contains three standard interfaces–AppleTalk, RS-232C serial, and Centronics parallel–and provides a rotary switch for choosing among them. Unlike most PostScript printers, the VT600 lacks a Diablo 630 emulation mode. That isn't important, however, when you consider this printer's typesetting bent; you'd be crazy to use a VT600 to imitate a daisy wheel.

The VT600's type drawer isn't as well stocked as some PostScript printers. The printer's ROM contains three font families: Varitimes (a version of Times Roman), Courier, and Symbol. The hard disk holds the Aristocrat family (Varityper's rendition of Helvetica). A floppy disk is included containing screen versions of all the fonts.

This font mix presents a problem for Mac users. Because the Mac's LaserPrep file expects to find fonts named Helvetica and Times Roman, it displays an error message every time the printer is initialized, even if those fonts don't appear in the document. Worse, Aristocrat and Varitimes aren't identical matches for Adobe's Helvetica and Times, which makes it impossible to print proofs of documents destined for the VT600 on a LaserWriter.

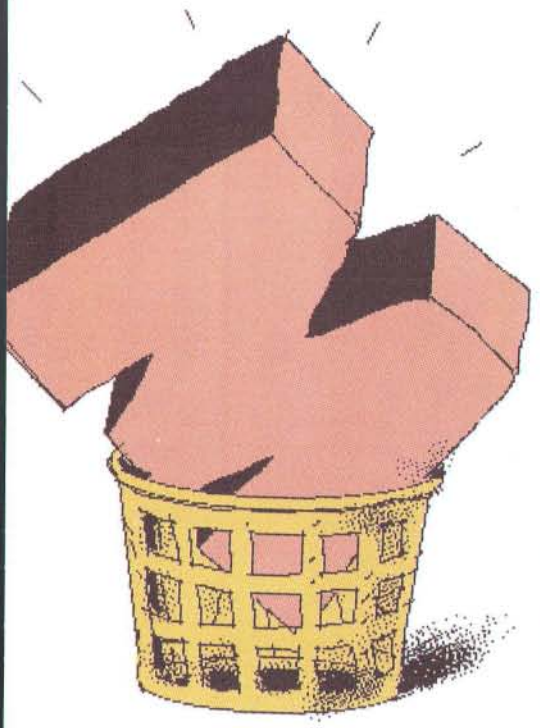
There is a solution, but it'll cost you: Varityper sells downloadable versions of Adobe's Times and Helvetica fonts for $190 each. The firm is negotiating with Adobe and Merganthaler (which owns the rights to Helvetica and Times Roman) to include those fonts with the printer, but at this writing, no agreement had been reached.

Technical Wizardry

The VT600's controller was designed with performance in mind. One example is its approach to downloadable fonts. On LaserWriter-class printers, downloadable fonts are stored on a Macintosh floppy or hard disk and downloaded to the printer over the AppleTalk network. The VT600, however, can store roughly 100 downloadable fonts on its own hard disk.

Half of the VT600's hard disk is reserved for downloadable fonts. The other 10MB have been set aside as a supplement for the printer's *font cache,* an area of memory that holds the bit-mapped representations of the characters that have been printed on a page. The bigger the font cache, the faster the printer handles typographically complex documents. (For more details on how PostScript printers work, see "Laser Wars," *Macworld,* June 1987.)

When the VT600's font cache fills, the controller saves the least recently used character bit maps on the hard disk. Retrieving characters from the hard disk takes longer than retrieving them from memory, but it's faster than rebuilding them from scratch.



The end result is stunning performance. In my tests, the VT600 was at least twice as fast as the QMS PS-800 Plus, which is two to four times faster than a LaserWriter (see "Lasers at a Glance"). That's especially impressive when you consider that the VT600 must manipulate four times the amount of memory to create a single page.

And the VT600's output is beautiful. Small type is tack sharp, and you almost need a magnifying glass to see any jaggies on large text. Hairline rules are fine and delicate; at 1/600 inch, they're half as wide as LaserWriter hairlines. Black areas also print beautifully, with no visible scan lines. The printer owes its sharpness in part to the fineness of its toner; one particle of it measures a scant 8 microns (eight millionths of a meter), versus the LaserWriter's 14-micron toner.

The Price of Power

While your heart will soar at the sight of the VT600's output, it will sink at its price. At $18,750, the VT600 is the printer for the rich of us. But Varityper denies that the VT600 is a laser printer, preferring to call it a "plain paper typesetter," aimed at high-volume desktop publishers, quick-printing outlets, and newspapers. From that point of view, it's a bargain. Its closest competitor, Linotype's 1270-dpi Linotronic 100, goes for $32,000. For many applications, the extra cost and the hassles of working with photographic paper and chemicals aren't worth the increased resolution.–*Jim Heid*

See *Where to Buy* for product details.

Lasers at a Glance

Specifications	QMS PS-800 Plus	Varityper VT600
Amount of RAM	2MB	6MB
Amount of ROM	1MB	0.64MB
PostScript version in unit tested	44	48
Microprocessor in printer controller	68000	68020
Built-in fonts	35	13
Free memory available at start-up	410,754 bytes	1,355,224 bytes
Size of font cache	279K	10K[1]
Number of paper cassettes	1	1
Maximum paper size	8½ by 14 in.	8½ by 14 in.
Capacity of paper cassette	100 sheets	200 sheets
Engine duty cycle	3000 pages/month	3000 pages/month
Writes white or black	black	black
Interfaces[2]	A, R	A, R, C
Emulation modes	Diablo 630	none
List price	$5495	$13,500
Performance		
Initialize and print *Word* document (16K)	03:47 min.	01:50 min.
Print *MacDraw* document (2922 objects)	08:20 min.	03:21 min.

[1]*Hard-disk-based font cache.*
[2]A *stands for AppleTalk;* R, *for RS-232C serial;* C, *for Centronics parallel.*

A comparison of Varityper's VT600 and QMS's PS-800 Plus. For specifications and test results of other PostScript printers, see "Laser Wars" in the June 1987 issue of Macworld.

Because the World Is Round

Dimensions *1.18*

3-D design and solid-surface modeler. ***Pros:*** *Fast, easy creation and editing of 3-D images; allows simultaneous work on up to 16 windows; extensive support of high-resolution output devices.* ***Cons:*** *Documentation hard to follow.* ***List price:*** Design Dimensions *$750 black-and-white, $1395 color;* Solid Dimensions *$395 black-and-white, $1295 color; both programs $2495 color;* DXF Transfer *$495; demo disks $25 black-and-white, $39 color.* ***Requires:*** *1MB.* ***Copy protection:*** *None.*

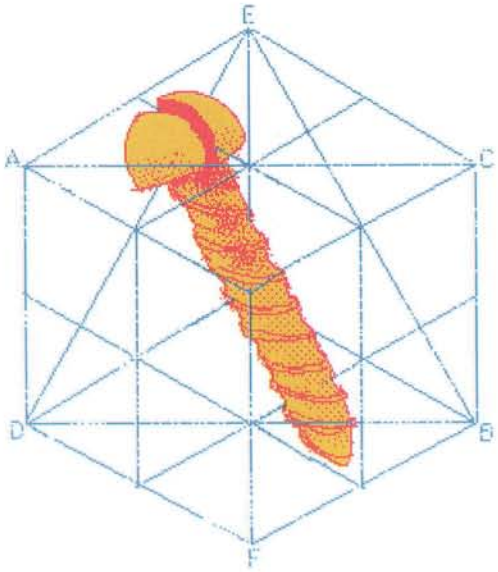
Dimensions, from Visual Information, provides an excellent set of tools for realistically visualizing 3-D objects–complete with shading, color, and highlights. This new package consists of two separately available programs: *Design Dimensions,* which allows you to create and manipulate wire-frame, polygon-filled, and shaded 3-D representations of objects; and *Solid Dimensions,* a full-blown solid-surface modeler that uses sophisticated rendering and ray-tracing techniques to turn 3-D wire-frame representations into beautifully shaded images of solid objects.

With *Dimensions,* you can visualize objects as small as a screw or as large as a space station. It's also effective for creating the high-quality logos seen on television or for producing illustrations for advertising and technical manuals. Architects can even use *Dimensions* to produce full-color, full-perspective renderings of floor plans and elevations.

In and Out

Although *Dimensions* can produce shaded black-and-white 3-D renderings, you will best appreciate this program on a color screen. For testing both modes, I used a black-and-white Mac SE and a "full-

ILLUSTRATIONS BY MARK ULRICH



house" Mac II with 8 megabytes of RAM, an extended video card, a 13-inch Apple color monitor, and a 19-inch SuperMac monitor and color board.

Dimensions makes possible ultra-high resolution and precise color beyond the reproduction quality you get from the LaserWriter or the color ImageWriter II. While you can create, store, and display detailed color images with the Mac's standard printers, for the best hard copy you'll need fancier color plotters or printers. Fortunately, there are drivers that take full advantage of *Dimension*'s special capabilities: creation of graphics on up to C-size paper (17 by 22 inches); of magnificent (8 ½- by 11-inch) color prints or overhead transparencies; and of 35mm slides of 4096 by 2730 pixels, all with 16.8 million colors available.

There are numerous ways of getting data into and out of *Dimensions*. For example, an optional bidirectional *DXF Transfer* module imports and exports files to and from *AutoCAD* and other PC-based CAD systems in the DXF format. Via a process called *meshing, Dimensions* also creates other files that can be fed to *MSC/pal,* a finite element analysis program for the Mac from MacNeal Schwendler. *MSC/pal* performs stress and vibration analysis on 3-D designs. *Dimensions* is also PICT- and Clipboard-compatible, so the 3-D images it creates can be sent to a variety of other Mac packages, including those used for desktop publishing.

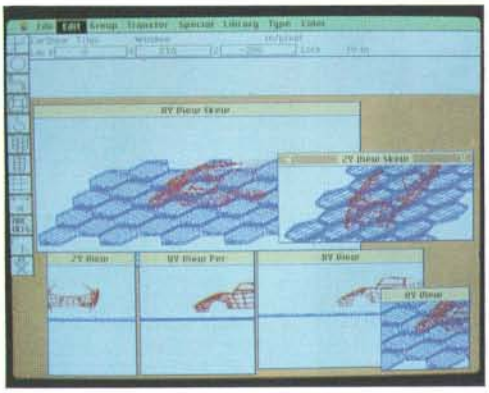
Dimensions in Depth

Dimensions is so rich in features and capabilities that you can't expect to master it quickly. Its extensive manual contains tutorials and explanations of concepts, but it's hard to follow. A new version with an index and table of contents is to be issued soon. *Dimensions* also comes with tutorials in the form of helpful "slide show" files on disk. In spite of the documentation's deficiencies, I was able to do a 3-D design in my first session after running through the tutorials. Visual Information also offers training courses in which you learn the intricacies of *Dimensions* from an actual instructor.

Design Dimensions presents you with up to 16 view windows (see "Open Windows") and numerous built-in facilities for creating lines, double lines, splines (with variable tension), and free-form curved surfaces. You can key in *x, y,* and *z* coordinates as well.

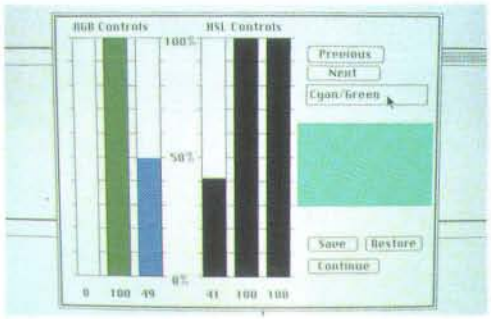
You switch colors through a pull-down menu that displays color bars, each of which you can alter to match any of the 16.8 million possible colors. To do this without being overwhelmed by hundreds of color choices on the screen, you use a sliding-bar control screen to visually modify the red, green, and blue content of colors, as well as their hue, saturation, and luminance (see "Color Control").

To speed up construction of complex objects, elements can be grouped and then copied, flipped, rotated, and even colored. You can store groups as symbols and recall them for additional use on new designs.



Open Windows

With Design Dimensions *you can open additional windows to work more easily on a 3-D design. Shown here are 6 (of a maximum of 16) open windows. As you drag the cursor from one window to the next, it automatically becomes active in that window. Each window can be made to show the design at different scales and orientations, and any window can vary in size.*



Color Control

Dealing with a choice of 16.8 million colors is easy with this color-control panel, used by both Design Dimensions *and* Solid Dimensions. *The panel permits you to independently vary a color's red, green, and blue content, as well as its hue, saturation, and luminance. The color box instantly shows you the adjusted color.*

Panning and zooming are accomplished through other sets of built-in facilities.

Moving Visuals

At any time during the design process, *Design Dimensions* can rotate a 3-D image on any of its three axes. Upon command, the system creates a replay file of rotated images in wire-frame, filled-polygon, or shaded form. Playing this back later produces a poor man's "animation" of the object.

Once you are satisfied with a design, you store it and then use *Solid Dimensions* to call it up again. *Solid Dimensions* presents different multiple orthographic windows from those in *Design Dimensions.*

The *Solid Dimensions* windows incorporate a *line of sight* bar that allows you to position the eye location and direction of viewing in three dimensions. When you move the line of sight, the resulting perspective view appears almost instantly in a third window. And this is only the beginning. *Solid Dimensions* takes the perspective view and renders it as a full-color solid with graduated shading and highlighting. You also have a number of lighting options. And with the addition of soon-to-be-released *Combine, Between,* and *Animate* modules, *Dimensions* will have a real-time animation capability of ten frames per second.

The ray-traced, full-color images *Solid Dimensions* generates rival those produced on engineering workstations or mainframe-based systems. *Dimensions* puts the Mac II's speed and graphics capabilities to excellent use.—*David L. Peltz*

See *Where to Buy* for product details.

Freedom from the Mouse

***QuicKeys** 1.0*

Control Panel macro utility. ***Pros:*** *Powerful, flexible, easy to use; application-specific macros can be separate from main System set; different sets can be easily loaded from within an application.* ***Cons:*** *Quick Access application interface is confusing.* ***List price:*** *$99.95.*
Requires: *512KE System 4.1 or higher.*
Copy protection: *None.*

Some Macintosh owners secretly agree with proponents of the IBM PC that a mouse is not always the most efficient tool. True, a few excellent macro programs available for the Mac offer a solution–most notably *Tempo* from Affinity Systems–but many people shy away from them because they seem too complicated. Now there's *QuicKeys* from CE Software, which simplifies defining a keystroke to perform actions normally accomplished with the mouse.

With *QuicKeys* you can easily assign ⌘-key equivalents to menu items without having to use *ResEdit*. Consequently, you can drag windows around, have text typed automatically, or scroll the contents of any window up and down, left and right, a line at a time, or a page at a time–all by using the keyboard. *QuicKeys* also lets you launch applications or documents just by hitting a single key, which means you can bypass the Finder completely.

Each System you run can have up to 100 QuicKeys installed, known collectively as the Universal set. You can also create an additional 100 QuicKeys for each application you use. When you invoke the Quick Reference QuicKey, it lists your Universal set on the screen. CE Software even provides drivers that allow you to print a template of your QuicKeys for reference positioning on your keyboard.

The utility comes with the Quick Access application for editing your keys, sample QuicKey sets, and printing templates. It also includes Init files for accessing alternative keyboards and the DialogKeys Init, for using the keyboard to click on the Open, Save, and Cancel buttons from within standard files.

Snappy Setup

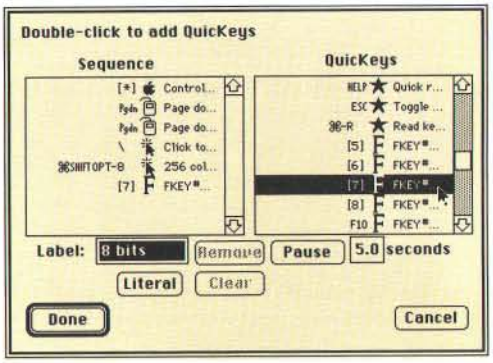
All this versatility wouldn't mean much if the program weren't easy to set up and use. Fortunately, it's a Control Panel device (cdev), so all you have to do is put the program into your System Folder. The next time you open the Control Panel (after rebooting), the *QuicKeys* icon appears along with the other cdev icons.

Once in the Control Panel, you select *QuicKeys,* and a scrollable window appears. Click on Define, and a hierarchical menu pops up with a list of available functions. Some of the choices in the Define menu, such as zooming, closing, or toggling between open windows, are programmed for you. When you select one of these functions, it is immediately highlighted in the *QuicKeys* window, ready to be assigned a key.

Some of the other functions, however, bring up more windows or dialog boxes when selected. For instance, selecting Clicks brings up a dialog box that prompts you to click on a location, then drag. After you perform the operation, you'll see another dialog box that allows further customizing. If you choose File, you can select any application or document, which will then appear in the *QuicKeys* window. After that, every time you hit the assigned key, you launch that file. If you select Menu/DA, you're asked to choose an item from the menu. Assign that item a keyboard command, and you can call it up with that keystroke.

The Power of Sequences

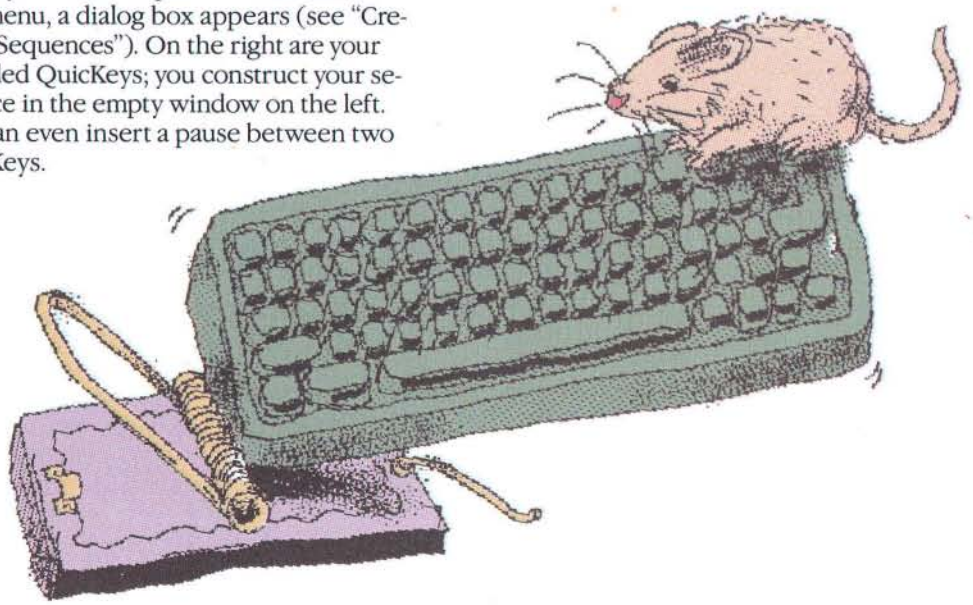
Sequences is a powerful function under the Define menu that allows you to group together single QuicKeys, then assign a single keystroke to the sequence. When you select sequences from the Define menu, a dialog box appears (see "Creating Sequences"). On the right are your installed QuicKeys; you construct your sequence in the empty window on the left. You can even insert a pause between two QuicKeys.



Creating Sequences
A team of QuicKeys can easily be grouped together using the Sequences function. The first key of this sequence opens the Control Panel; the next two scroll down to the Monitor cdev; the fourth selects the Monitor icon; the fifth key performs a click on 256, which changes this Mac II to 8-bit color mode; and the last is a function key that closes all open desk accessories. Merely pressing ⌘-8 runs the entire sequence.

Accessing Keys

Quick Access is a terrific *QuicKeys* application that not only lets you edit sequences but also provides complete editing control over all QuicKeys. It lets you open your Universal set–or any of your application sets–edit them, save the sets in separate files for safety and future reference, and then install them right back into *QuicKeys*. You can later open a saved *QuicKeys* file at any time (from anywhere) and temporarily use a whole other set of keys. Using Quick Access for the first time can be slightly confusing, but the excellent manual clearly explains how to use it.



Magic at Your Fingertips

QuicKeys has become indispensable to me. Granted, this product really comes into its own with the Extended keyboard, but Mac Plus owners can benefit from it as well. You can use it for simple functions, like calling up your favorite DA from the keyboard, or you can totally customize your Mac environment by filling your hard disk with thousands of QuicKeys.

Taking into account the incredible utility it provides, along with the extra goodies you get when you buy it, *QuicKeys* is a fine value. It can accomplish almost everything you want from a macro program without sacrificing power for ease of use. *–Rob Hahn*

See *Where to Buy* for product details.



Heavy-Duty Design

***PowerTools** 1.3*

Software analysis and design tools. ***Pros:*** *Well-crafted set of professional tools; integrated to cover analysis, design, and coding processes.* ***Cons:*** *Expensive; presently limited to traditional, single-task applications; inadequate manual.* ***List price:*** *Complete set $3295; individual modules: FreeFlow $1895; PowerPDL $995; Smart Chart $1495.* ***Requires:*** *512K.* ***Copy protection:*** *Key disk; installs on hard disk.*

Originally sold as *Prism, PowerTools* is a set of three integrated modules for software analysis and design: FreeFlow, PowerPDL, and SmartChart. Although the modules may be purchased separately, used by themselves they are of limited value, with the exception of FreeFlow. Together, though, this powerful trio can help you through the major stages of a software development project, from analysis to program coding.

PowerTools is as easy to use as the Mac interface, but without a hard disk it won't be as practical. Because you're likely to create large data files, the modules are inconvenient to run on floppy disks. Also, since data is kept in memory, larger projects may require 1 megabyte of memory.

Interactive Data-Flow Diagrams

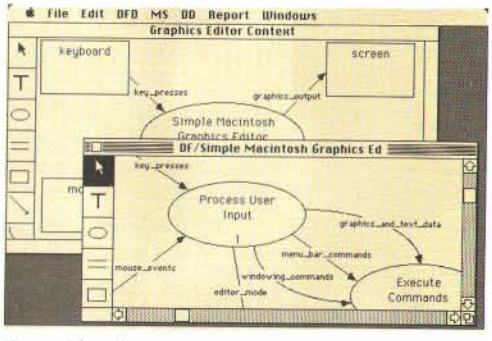
Systems analysts use data-flow diagrams to analyze operational systems, illustrating how information is used and modified as it moves through the many processes of designing a system. By refining these diagrams, the analyst creates a functional model of the system, which can then be expressed as a computer program.

FreeFlow, the first module in the *PowerTools* series, is an interactive data-flow diagram editor. Keeping diagrams on the Mac greatly simplifies the task of creating and maintaining them (see "Free Flowing"). FreeFlow includes a data dictionary for tracking the many names of processes, flows, stores, and terminators used in a diagram. In addition, several checking functions help prevent conflicts, unattached flows, or multiple definitions.

Pseudocode and Structure Charts

Using the pseudocode editor in FreeFlow, you complete an analysis by describing its primitive processes. These "minispecs" are then combined into a single pseudocode file, which is read by the second *PowerTools* module, PowerPDL, which then creates additional documentation from the pseudocode as well as a special structure file for use by SmartChart, the third module.

SmartChart is a language-sensitive editor that uses the structure file created by PowerPDL to display a structure chart of the program. Using the structure chart as a navigational aid, you can quickly locate various procedures and functions within the code file and keep track of calling hierarchies (see "Charts with Smarts").



Free Flowing

The data-flow diagram shown here is the explosion of the main process from the Simple Macintosh Graphics Editor example. Data is indicated by arrows, while ovals indicate processes. The two processes in the front window may be further decomposed through a similar set of explosions.

You write the program source within the structure of the pseudocode file previously created by FreeFlow; all the pseudocode is then transformed into program comments. As long as you maintain these comments while changing the program, you can regenerate the structure chart. Keeping the chart current with the program code makes it easy to keep documentation up to date.

Managing Code and Data

FreeFlow is probably the most useful of the programs, particularly as an analysis tool. Its data dictionary and data-checking functions simplify life considerably. Unfortunately, the lack of a browse feature makes maintaining the data dictionary cumbersome.

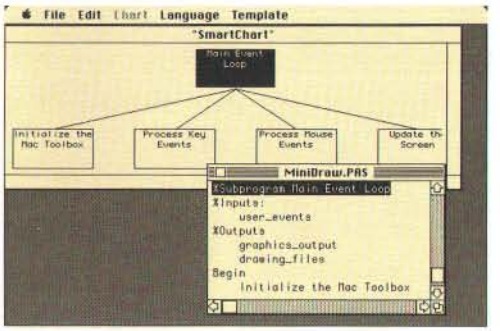
As a language-sensitive program editor, SmartChart is useful for writing code in most structured languages. A number of language-specific program structures, such as IF-THEN-ELSE or BEGIN-AGAIN forms, can be inserted into a program source by selecting them from a template menu. You can configure the editor to present templates specific to a number of popular languages, including Pascal, C, and Ada. Iconix also offers templates for other structured languages.

Although the structure-chart function of SmartChart is useful, it's limited to navigation–you can't edit or create structure charts as you can data-flow diagrams. Neither does it show the current data couples (the parameters passed) between procedures, but Iconix plans to add this feature.

To generate structure charts with SmartChart, you need PowerPDL. Without it, SmartChart is merely a language-sensitive editor. The value of SmartChart and PowerPDL lies in their combined ability to maintain the documentation of a programming project; FreeFlow, on the other hand, works well as an independent tool.

Recommended, within Limits

For experienced professional systems analysts, programmer-analysts, and software engineers working on complex software projects, *PowerTools* is an excellent design aid. Compared to similar systems running on minicomputers or mainframes, it provides comparable power at a fraction of the cost. At present, however, *PowerTools* is limited to traditional programming applications. The tools of real-time analysis, such as state-transition and control-flow diagrams, are not yet available.



Charts with Smarts

The structure chart is shown in the background, while the foreground shows the pseudocode for the corresponding subroutine. Subroutines are quickly located by double-clicking on the appropriate function box in the SmartChart window.

The manual is not easy to use, either as a tutorial or as a reference. Figuring out how to use the modules is difficult, and finding information on what the features do and how they work is even harder. In addition, the sections for each of the modules appear to have been written independently of each other, so their interrelationships are not made clear.

Finally, *PowerTools'* high price puts it beyond the range of most independent programmers working on small projects. But for professionals involved in large, complex programs involving many programmers, it is invaluable.–*Ken Takara*

See *Where to Buy* for product details.

A Graphics Workhorse

***Canvas** 1.02*

Graphics program. ***Pros:*** *Includes desk accessory version; offers high-resolution bit-map editing.* ***Cons:*** *Incomplete documentation.* ***List price:*** *$195.* ***Requires:*** *512KE, System 4.1 or later; external drive or hard disk recommended.* ***Copy protection:*** *None.*



A number of Macintosh graphics programs, such as *SuperPaint* and *GraphicWorks,* integrate the object-oriented graphics of *MacDraw* and the bit-mapped graphics of *MacPaint.* But they accomplish that by adding some *MacDraw* features to what are basically paint programs. *Canvas,* from Deneba Systems (creator of the *MacLightning, Voila,* and *Memorandum* desk accessories), truly brings together these two independent worlds and adds features to both–including the option to run the program as a desk accessory.

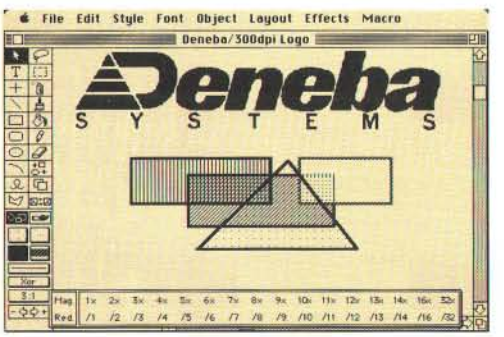
Set Up Your Easel

While most of the tools you see when you open *Canvas* are familiar to users of *MacDraw* and *MacPaint,* there are seven buttons at the bottom of the *Canvas* palette that present pop-up menus of pen and fill patterns, colors, line weights and types, transfer modes, and zoom ratios (see "Pop-up"). These menus not only display their current settings but also allow you to change settings quickly.

Unlike *SuperPaint,* which uses two separate planes for PICT and bit-mapped graphics, *Canvas* lets you work on one plane. You have the option to define an image in draw, paint, or high-resolution paint format, and can mix those formats to any degree in a single document. You can also embed PostScript commands.

After the object is created, changing its type, line and fill patterns, scale, and exact location on the page is easy. To change a rectangle to a paint object, click the check box next to Bitmap and use the pop-up menu next to it to set the resolution–from 72 dots per inch (dpi) to the LaserWriter's 300 dpi or even the Linotronic 300 Imagesetter's 2540 dpi.

To paint in a newly defined paint object, just double-click on it, and *Canvas* switches to painting mode. Inside the boundaries of the paint object, the painting tools are activated and operate at the ob-



Pop-up

With the Magnification pop-up menu, you can quickly magnify or reduce your view of an object on screen. This example shows overlapping objects with different transfer modes.

ject's resolution. *Canvas*'s almost unlimited zoom capability makes editing any paint object easy, and the ability to edit 300-dpi graphics is a boon if you use a scanner. But bit-mapped graphics have ravenous appetites–a 1-inch-square bit map at 2540 dpi takes 788K of memory–so don't expect to edit large, high-resolution bit maps unless your Mac has lots of RAM.

Objects of Admiration

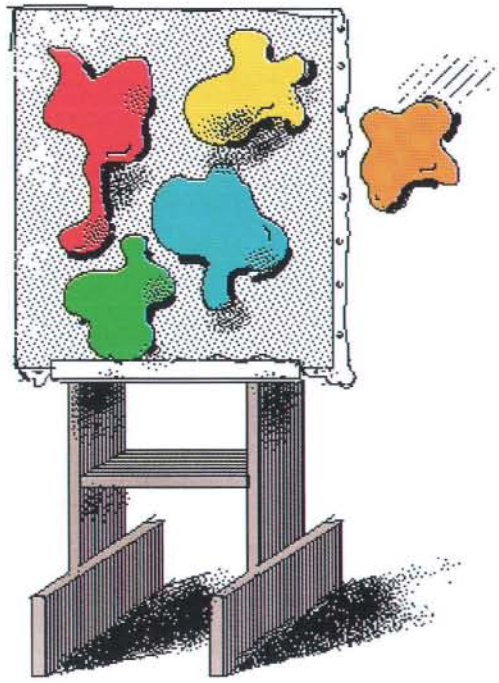
Normally in drawing programs, objects obscure other objects behind them. *Canvas* gives you some control over this for each object by letting you set different transfer modes, which have different effects on overlapped objects. Say you have created a circle and a square on screen, and you've positioned the circle so part of it overlaps the square. If you specify the Copy transfer mode, the portion of the square covered by the circle will remain out of view. If, however, you specify the Or transfer mode, the undercover portion of the square will show through, as if part of the circle were transparent. The Or transfer mode achieves this effect by showing a pixel as black if it's black on the top object *or* black on the object underneath. Unfortunately, Apple's LaserWriter driver doesn't support transfer modes–it prints everything as opaque–so your alternatives are the ImageWriter at one extreme and the Linotronic at the other. And *Canvas*'s documentation never explains what each transfer mode does. Several pages of examples would be helpful.

Canvas even lets you define your own object types and store them as macros (dubbed *MacrObjects* by Deneba) that are added to the Macro menu. Up to 16 macros can be added to the Macro menu at one time, and they can be swapped in and out at will.

MacrObjects behave much like tools on the Tool Palette. If, for example, you commonly use triangles in your drawings, you can define a triangle as a macro object. Choosing your triangle on the Macro menu and dragging draws a triangle. Alternately, choosing your triangle and clicking draws a triangle exactly like the one from which the macro was created.

Squeezing Paint

Amazingly, Deneba has been able to cram 80 percent of the functionality of the *Canvas* application into a desk accessory version called *Canvas DA*, which comes with *Canvas* or is available separately for



$99. Deneba claims that this DA is more powerful than most stand-alone graphics programs, and I have to agree. No longer do desktop publishers have to exit their page-layout program to make a last-minute revision to a graphic.

Canvas doesn't have all the PostScript support of, say, *Cricket Draw,* but Deneba plans to add more in future versions. They also intend to provide libraries of MacrObjects, plus direct control of most popular scanners. All things considered, *Canvas* is more than just another Macintosh graphics program.–*Laurence Kirsh*

See *Where to Buy* for product details.

Come On, Let's Go

Go for the Macintosh

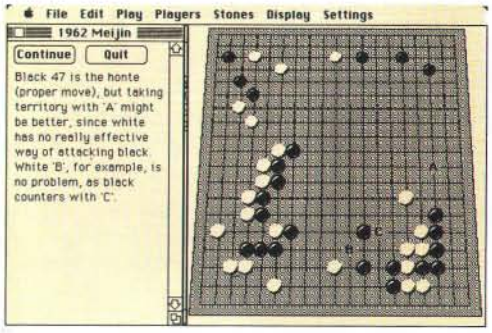
Board game simulation. ***Pros:*** *Decent level of play; great flexibility in setup and display; superior introduction for beginners.* ***Cons:*** *Playing is addictive.* ***List price:*** *$39.95.* ***Requires:*** *512K, 800K disk space.* ***Copy protection:*** *None.*

Go, the 4000-year-old national game of Japan, is an extremely refined and aesthetically pleasing pastime. The rules are simple–anyone can learn to play at a recreational level in ten minutes–but devising good strategy is far subtler than in master-level chess. Go inspires a different view of conflict, since playing develops a complex pattern, rather than an increasingly empty board.

The Tao of Go

It's a triumph that computer Go even exists–as late as the middle 1970s anything but beginner's play by a computer was thought to be impossible. Unlike in chess, the Go board fills up, forcing the computer to study the details of increasingly large and complex patterns. Even hundredfold speed increases in conventional computer architecture won't let machines play Go at a strategic, master level. Because of this complexity, the First International Computer Go Tournament wasn't held until 1986, nearly 20 years after the appearance of the first competent computer chess games. *Go for the Macintosh* from Infinity Software placed first for microcomputer entrants in the tournament and fifth overall.

Go is an excellent match for Mac graphics, which give the computer game a nicely realistic look, as opponents alternately place black and white stones on a square grid (see "Masters at Play"). The aim of the game is to capture territory by enclosing it within a line of stones. Although stones can be captured and removed from the board during small battles,



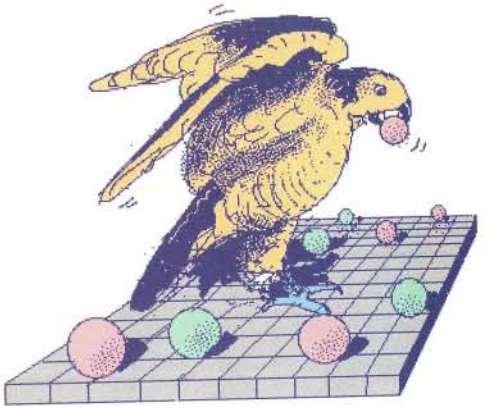
Masters at Play

Go lets players choose a 3-D view of the board and rotate it to "study the angles." This figure shows the middle stage of a classic game between two of the best Japanese players, annotated at left by the program.

the result of a Go game is typically a complicated, beautiful arrangement of stones on a nearly filled board.

Picking Up the Moves

Go for the Macintosh provides an excellent way to learn the game and proves a talented and forgiving opponent. The pro-



gram includes a tutorial managed by the hypertext program *Mini-Guide,* which lets you step through examples and beginner's practice games interactively. The tutorial is based on the American Go Association's standout text *The Way to Go,* which is the clearest exposition on the game yet produced.

Go can also annotate the computer's moves during a game. The program lets you take moves back and give yourself handicap stones. The board adjusts from the standard 19-by-19-line grid to a smaller 9-by-9 or 13-by-13 grid for faster games (a 9-by-9 game takes about eight minutes). This feature helps you practice tactics on a small scale.

Higher Levels

If you already play Go, you will find *Go for the Macintosh* more patient and probably more capable than most of your human opponents. Although no program is likely to play *dan-level* Go (the highest master level in Japan) anytime soon, this program can take on good players at a university Go club. You also can change the computer settings for the number of moves played ahead, making play more difficult; you can change the relative weights for stone capture versus territorial moves; and you can set 20 or so parameters that direct strategy and tactics. In effect, you can improve your game by putting more pressure on your particular weaknesses.

Go lacks long-range strategic sense, but the program is adept enough in small battles to keep you quite busy. Also, on the 9-by-9 and 13-by-13 grids, where the number of possible moves is much smaller, the program can seriously challenge strong players. And of course, if you are one of the few Americans with 5-dan amateur status, you can always give the program a few handicap stones to make things more exciting.

This program is a masterpiece and one of the best recreational software bargains around.—*Charles Seiter*

See *Where to Buy* for product details.

A Tutor for Freshman Physics

Physics

Introductory science tutorial. ***Pros:*** *Brilliantly animated illustrations of many basic principles of physics; interactive quiz mode; coordinated with standard text material.* ***Cons:*** *Weak spots in material; a few problems with Problem mode.* ***List price:*** *$99.95.* ***Requires:*** *512K.* ***Copy protection:*** *Key disk.*

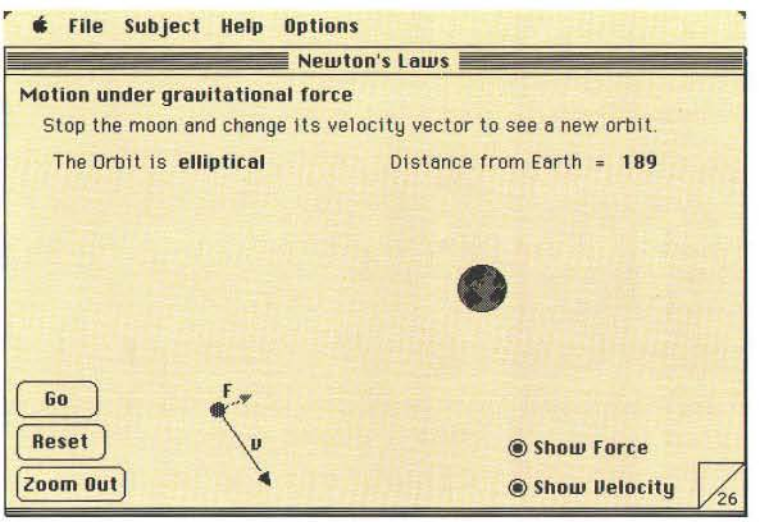


Physics is a subject that presents unique teaching difficulties. Progress depends on insight in applying mathematics, which students often have a somewhat shaky background in. So there are two challenges: a given physical situation must be presented in a meaningful way, and the related math must be made simple and clear. The first challenge usually calls for pictures, the second for ingenuity. *Physics,* from Sensei Software, shows plenty of both. It is the most effective physics tutorial available, with the possible exception of some experimental systems elaborated by physics departments at large universities. *Physics'* developers have successfully attacked formidable pedagogical problems and created a product that is both entertaining enough to appeal to the intellectually curious and a boon for science students at all levels.

Around the World in 80 Seconds

Physics follows this format: an animation of a diagram from a standard physics text is followed by a selection of interactive problems for drill in the basics of physics calculations. Despite the innovative features of the program, it is well connected to standard teaching practice, and it's easy to match up textbook problems with those in the software. Although you might want to work through *Physics* chapter by chapter, the program's index moves you immediately into any of the several hundred topics available.

"In Orbit" shows a typical animation: the force and velocity vectors for a moon in orbit. You can change orbit starting conditions (the direction and magnitude of the velocity vector) and even send the hapless satellite hurtling off into deep space, if you like. Diagrams frequently have italicized "hypertext" terms which, when clicked on, show a highlighted part of the diagram. In many examples, a button for calling up a calculus-based description of the diagrammed situation is also provided. The animation is then usually followed by several sample problems, which can be solved



In Orbit
The animated textbook illustrations in Physics *can be easily matched with static examples from a textbook, but they convey an amazing amount of information simply by moving. This example imparts a feeling for the delicate balance of forces required for a stable orbit.*

using a pop-up scientific calculator. Problem solving is facilitated by several options; the program may refer you to sections of text for help, and it features a Hint button in many difficult cases.

Problems 2.1 and 2.2

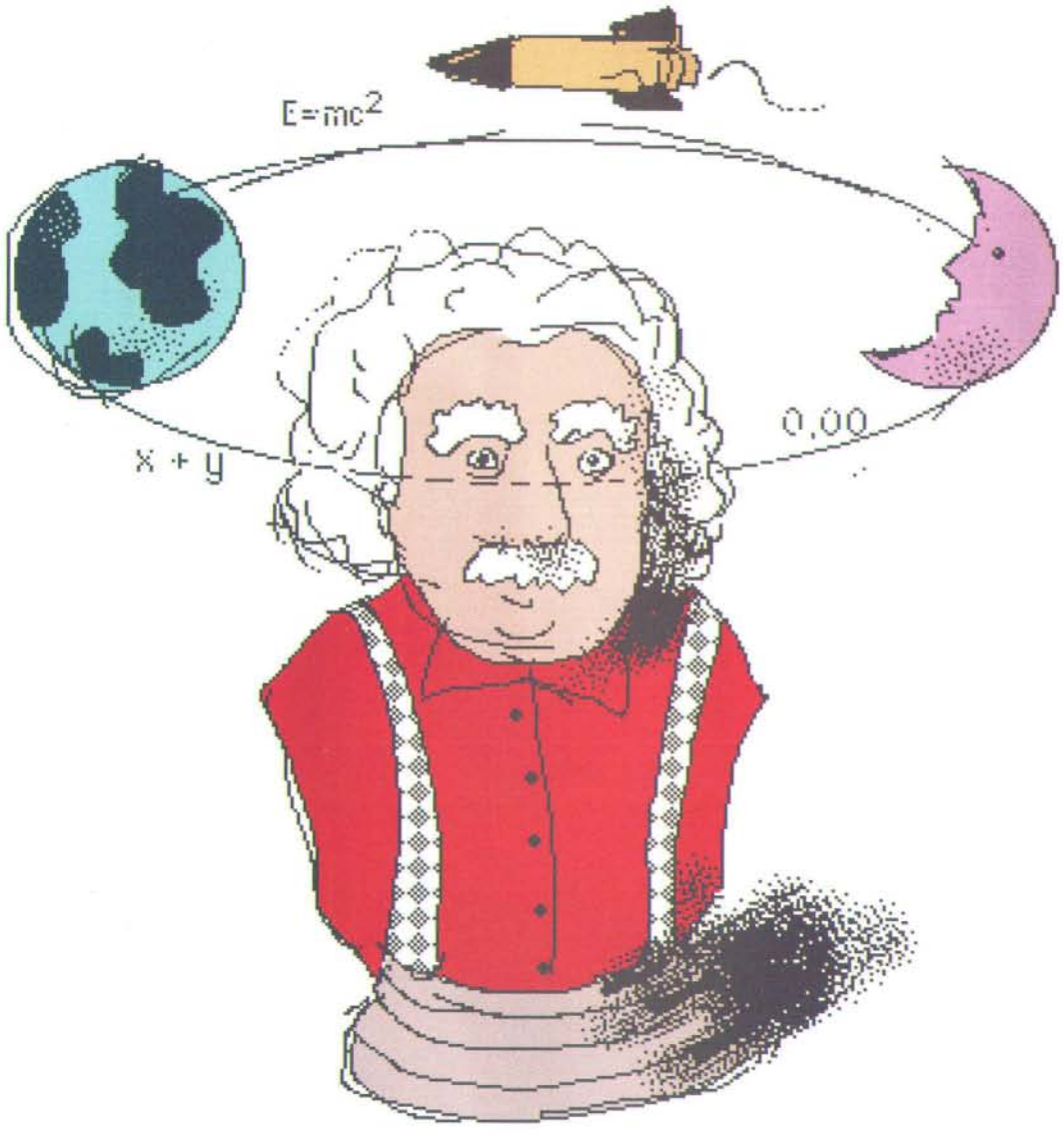
The first five chapters of the program are the best introduction to mechanics you are likely to find. Since this material represents the first third of a one-year physics course, it's crucial. *Physics* is just the thing for building students' confidence and clarifying basic concepts. The chapters on electricity and magnetism are also very good.

It's not clear whether the developers ran out of energy or just disk space, but the material on thermodynamics and on waves is weak. Perhaps the market doesn't justify expanding this program into *Physics I* and *Physics II,* but it would be valuable from a teaching viewpoint to enhance these sections and add a few more.

The Problem mode also has a modest design shortcoming. Despite admirable effort in the text to impart the idea of significant figures in a calculation, the program simply signals *Incorrect* if you enter a typical unrounded calculator answer in a problem. This may confuse students, especially when they have set up the solution correctly, and there should be a separate flag to specify *Incorrect–too many digits in answer.*

These are mild caveats about a program that does an excellent job overall. This approach could be extended to any part of the science and engineering curriculum. Sensei has developed a similar program for geometry and is preparing one for calculus. It would be good news for education if Sensei extended the format through differential equations and beyond. *–Charles Seiter*

See *Where to Buy* for product details.



It Won't Necessarily Get the Job

ResuméWriter (Personal Version) *1.0*

Résumé-writing aid. ***Pros:*** *Automatic reformatting; ease of use.* ***Cons:*** *Lack of format flexibility; limitations on entry size; can't see whole document while writing.* ***List price:*** *Personal Version $100, Student Version $30.00.* ***Requires:*** *512K.* ***Copy protection:*** *Initialized to user.*

BW I've been writing résumés professionally for many years and doing it on the Mac since 1984. With as many as ten résumés a week flowing through my office, I'm always interested in anything that makes my life easier.

ResuméWriter, from Bootware Software, lets you switch among three formats (actually four formats, but two are very similar) and does all the layout chores itself. And it's a good tool to help clarify one's history and goals–particularly for someone with a fairly traditional work history. A résumé generated with this package will help get you started, but *ResuméWriter* won't save a résumé weakened by passive language, lack of focus, or wordiness.

Preparing Your Résumé

As with many database programs, information is entered on a series of screens. To enter a job, for example, you fill in the company name, address, and phone number. The next screen allows a few lines to describe the company. And the screen after that prompts you for your job title, job description, and starting and ending dates.

Each screen is fully editable, and when you're preparing different versions of a résumé you can choose whether to include or exclude a screen. However, you can't exceed the space the program allows for each entry (for a job description, it's only about 3½ lines in 12-point Chicago). And because the text-entry box cannot be filled completely, you think there's still a line and a half to go when it runs out of room.

For creating a custom version of your résumé, you may include or ignore any screen, but you can't choose between fields in the same entry screen. You can, however, define your own category headings, which is a nice feature.

All content editing is done at the screen level. When viewing the whole résumé, you can change formats, select fonts, and add visual garnishes, but you can't change any of the information you've entered. This means that as you edit, you can neither see the complete entry for a job, nor the total product. But it's easy enough to go back to any of the data-entry screens and change details.

The Program's Assumptions

ResuméWriter makes some questionable assumptions about how résumés should be written. It asks for irrelevant information, such as the complete address of all employers, and allows as much room for a company description as a job description. While you can work around these limitations, it would be easy for the inexperienced to bury crucial information under trivia.

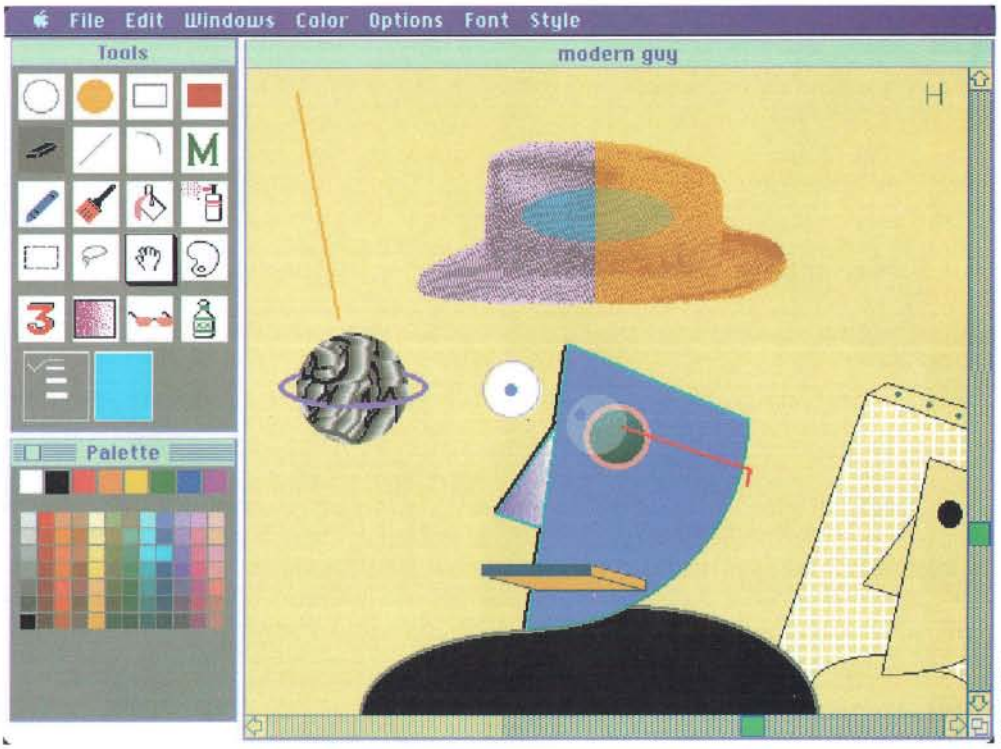
The program provides three basic formats: two columns; one column with left-justified section heads and indented text; and one column with centered heads or a combination of centered and left-justified section heads. It does not support the popular bulleted format; all entries must be in paragraph form. And it limits you to nine job entries and three education entries.

ResuméWriter's formats work well enough for those with typical work histories. But for others it's not flexible enough. I use over a dozen résumé formats, depending on what makes the client look best.

Perhaps *ResuméWriter*'s problem is its perceived niche in the market. While it's not a good choice for the novice writer working on a personal résumé, it would clearly work in classrooms, and as one of several tools for professional résumé writers.

Bootware plans to add the capabilities to edit paragraphs in the Display Resume mode (thus allowing bullets), to create multipage curriculum vitae, and to export files to popular word processors. So the program may yet grow from a useful clarification tool into a serious résumé writer. *–Shel Horowitz*

See *Where to Buy* for product details.



JOHN HERSEY

The Modern Guy

Several of Modern Artist*'s features appear in this picture created with the program. The hat is a scanned image imported and colorized. The planet is a gray-scale image also imported, and the mouth is a 3-D box from the rectangle tool.*

Chromatic Options

SuperChroma

Add-on hardware and software color system. ***Pros:*** *Easy-to-master* MacPaint*-like interface; video freeze-frame option for capturing TV images.* ***Cons:*** *Expensive; screen flickers; low resolution; slow at times.* ***List price:*** *SuperChroma with* ChromaPaint *$1500; Enhanced Video Option $1500; Sony Trinitron 12-inch monitor $650.* ***Requires:*** *512K, 800K disk space.* ***Copy protection:*** *None.*

Modern Artist

Color paint program for the Mac II. ***Pros:*** *First color paint program available; easy-to-use interface.* ***Cons:*** *No video freeze-frame option; low resolution.* ***List price:*** *$199.* ***Requires:*** *Mac II.* ***Copy protection:*** *None.*



Long before the arrival of the Mac II, Computer Friends offered color on the Mac. With the SuperChroma system, comprising a display graphics controller, a color monitor, and *ChromaPaint* software, you can paint in color on a Mac 512K, a Plus, or an SE. Color illustrations can be created with *ChromaPaint*'s *MacPaint*-like drawing tools, and images from *MacPaint* and other graphics programs can be imported to *ChromaPaint* and colorized.

The basic SuperChroma system–graphics controller, monitor, and *ChromaPaint*–sells for $2000. It requires no modifications to your Mac, and it's connected by a cable to the modem port.

With the Mac II now available, SuperChroma may seem an expensive way to add color, especially when you consider that it runs only *ChromaPaint*–no other Mac programs, color or otherwise, can appear on the color monitor. It also uses both screens at once: the Mac screen displays the menu bar while the SuperChroma monitor works as the paint canvas (which is four times the size of a *MacPaint* canvas). But SuperChroma offers two advantages: it adds color capabilities to Macs not designed for color; and it provides a link to NTSC video, the U.S. standard for television signals.

For an additional $1500, Computer Friends' Enhanced Video Option (EVO) provides an interface to a television set, a VCR, or a video camera. With this setup, you can overlay *ChromaPaint* graphics or titles on a video image and then return the image to its video source. A freeze-frame option lets you capture an image from a video source and work with it as a *Chroma-Paint* image.

Painting in Color

For the Mac II, Computer Friends also offers *Modern Artist,* the equivalent of *ChromaPaint,* for $149. However, *Modern Artist* requires 2MB of RAM. (Since the two programs are virtually the same, references to *ChromaPaint* in the following description apply to *Modern Artist* as well.)

ChromaPaint offers distinct improvements over *MacPaint,* such as a bigger drawing area and a wider array of tools. It also has an improved spray can and an arc tool. For the most part, however, *ChromaPaint*'s tools mimic those of *MacPaint.* The feature that really sets *ChromaPaint* apart is, of course, color. You can use as many as 96 colors simultaneously from a palette of 256, and you can adjust colors for hue, tint, saturation, or intensity in either the palette or the drawing area.

ChromaPaint's other notable advantage over *MacPaint* is the addition of 3-D effects. Although primitive when compared to those of 3-D CAD programs, such as *Mac3D* or *Pro3D,* they provide a way to automatically add three-dimensional shading to objects in an illustration. You use the 3-D tool in conjunction with the filled rectangle tool to create cubes, or with the filled circle to produce shaded spheres. The tool not only shades objects but allows you to choose a light source before rendering them. Other interesting shading effects are possible; for example, using the 3-D tool with the selection rectangle produces a rectangle with a continuous shading between two colors.

ChromaPaint has an annoying screen flicker caused by a problem with the NTSC signal. You can work around it to a degree, but not entirely. Both programs are extremely slow at times; more than once I thought they had frozen. But on the whole, *ChromaPaint* seemed bug-free, and the minor problems I experienced with *Modern Artist* probably occurred because I was working with a prerelease version.

Balancing the Options

After using the two programs in the same work sessions, I found *ChromaPaint* slightly superior. It offers the video freeze-frame option, a larger canvas, more tools, and more 3-D effects than *Modern Artist.* These are minor differences, however, and *Modern Artist* has a few pluses of its own, including superior FatBits, color control, Rotate and Flip commands, Undo capabilities, and better documentation.

To enable you to print what you see on the screen, Computer Friends offers the Shinko CHC-335 color thermal printer at $4590 for the standard model and $7800 for a model that handles up to 11- by 14-inch pages. At 200-dots-per-inch resolution, this printer's output is closer to that of a LaserWriter than an ImageWriter, but it still is not printshop quality. The company also has a PostScript program that allows you to produce color separations directly from the screen. *Color Sep* ($99) makes a PostScript screen dump and automatically produces a four-part separation. And Computer Friends' $599 genlock card, TV Producer, makes the Mac II's video card compatible with NTSC signals, so you can overlay live video with graphics and titles.

The SuperChroma system offers NTSC compatibility, but it is an expensive way to add color capability to the Mac. *Modern Artist,* on the other hand, is a good product at a reasonable price.—*Scott Beamer*

See *Where to Buy* for product details.

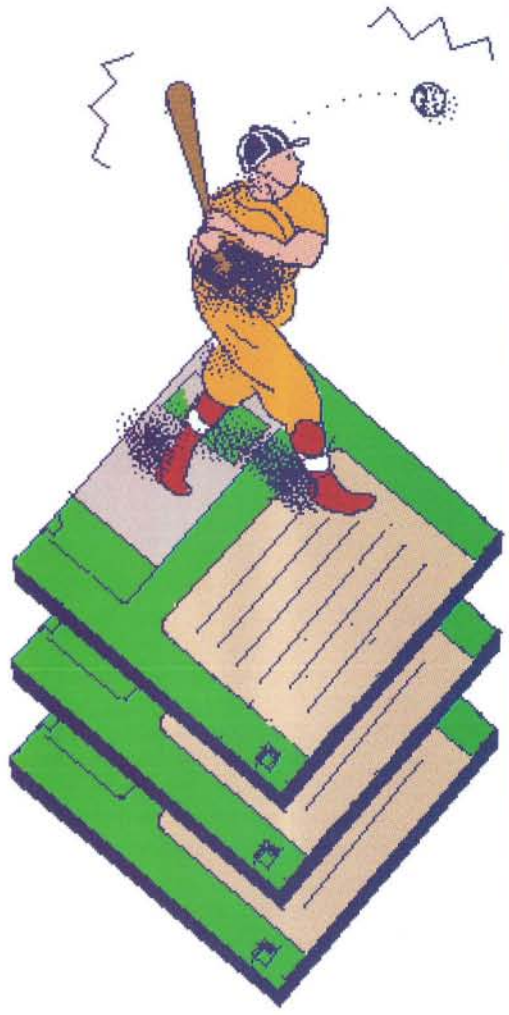
This Base Is Loaded

1stDesk *3.5*

Relational database system. ***Pros:*** *Good report generation and mail-merge capabilities; built-in telecommunications software; can scan a* MacPaint *form to create a data file design.* ***Cons:*** *Documentation poorly organized and hard to use.* ***List price:*** *Four-module system $195; multiuser version 4.0 $295; demo version (10 records) free.* ***Requires:*** *128K.* ***Copy protection:*** *None.*



1stDesk is a relational database system that does more than just keep track of data. An enhanced version of *1stBase,* one of the first databases for the Macintosh, *1stDesk* consists of four program modules: 1stFile, 1stScan, 1stMerge, and 1stPort. The program handles large records and files and has an array of powerful, advanced features, such as the ability to convert data between file formats; to generate sophisticated, attractive reports; and to merge print forms, labels, and envelopes.



Four of a Kind

Although it's in the same class as *Omnis, Helix,* and *Reflex,* easy-to-use file design sets 1stFile apart (see "Blueprinting"). Data entry is also simple; you just choose Add Records from the Forms menu to display a blank data entry form. 1stFile's relational capability lets you combine several files into one (the files must share one field that has the same type and length). Reports are easy to design and can include macros for calculating new information. Printed reports are restricted to one font, but can be exported to *MacWrite* for more elaborate formatting.

1stScan uses a simple method to create a database blueprint and a custom data-

entry screen: it scans a *MacPaint* image of a form (either drawn or scanned with a digitizer) and creates a blueprint for the data file based on underlined spaces and blanks. In 90 seconds an exact duplicate of the form appears on the screen, ready to use for database entry. The program lets you scan different fonts, type styles, and even graphics. Adding information to a new data file is as simple as filling in a form, so virtually no training is needed to get started.

1stMerge is a powerful, flexible mail-merge utility designed to work with 1stFile data files and *MacWrite* (and other word processors that accept *MacWrite*-format files, such as *Microsoft Word* 3.0). Unlike other print-merge programs, 1stMerge does not require you to save data in a special format. You simply set up a form letter in *MacWrite,* enclosing field names in brackets, then return to 1stMerge to print. The Scan/Don't Merge feature lets you preview your form letter before printing to make sure field names and brackets are entered correctly. Sample *MacWrite* documents are included for printing envelopes and mailing labels, up to five across a page –a feature most other mail-management programs don't provide.

1stPort is a data-transport and file-conversion utility that allows you to change text and data files from 1stFile, DIF, SYLK, and flat-file formats to any other format. You don't have to convert a file initially to 1stFile format; 1stPort can, for example, convert a *Multiplan* file to *1-2-3.* The program supports telecommunications for modem and hard-wire links (up to 9600 baud). It also includes a text editor, so you can remove control characters and other garbage from files that have been received and adjust column boundaries to display data more attractively.

The Minus Side

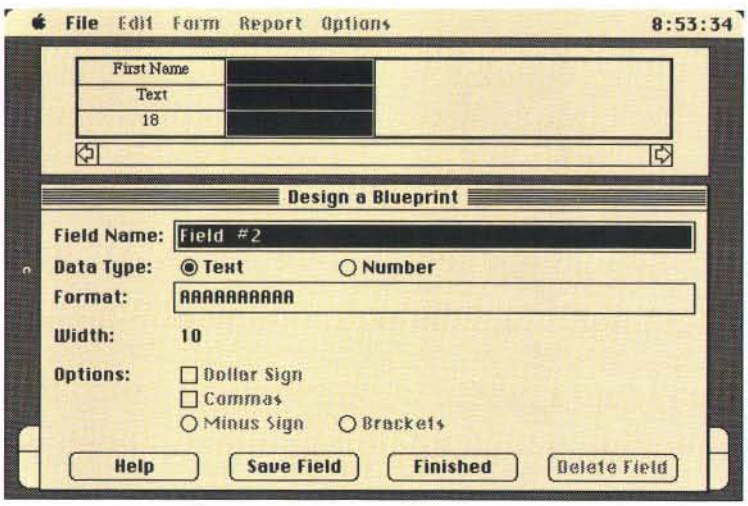
1stDesk has some shortcomings. It deviates from the Mac interface in small ways. For example, to save a report design you select Save from the Report menu rather than from the File menu. Another minor inconvenience is that data file searches start at the displayed record, not at the beginning of the file, so before initiating a search, you must return to the first record.

1stDesk has been upgraded several times. Reports designed using earlier versions of the program are incompatible with later versions. To upgrade a report, you must re-create the design by either copying the old instructions manually or capturing them via screen dumps one screen at a time–an inconvenient procedure.

Context-sensitive help is available online, but often you must refer to the lengthy, poorly composed manual. Though the manual's tutorial sections are well written and illustrated, references are difficult to find. Many pages are not numbered, there is no table of contents, and the indexes are buried in the body of the manual.

Althought the manual is disappointing, the program is excellent. Overall, *1stDesk* is a capable database manager with simple file design, powerful mail management, and sophisticated file-conversion capabilities. Be sure to look at the free demonstration disk before you buy this database manager.–*Nanci Hamilton*

See *Where to Buy* for product details.



Blueprinting
Before you can enter data, you define the fields that make up each record. 1st Desk's *1stFile module recognizes two types of fields: text and numeric. Field length is set by clicking within the Format box and typing characters. To modify an existing Blueprint, open the data file you wish to alter and select Change Blueprint from the File menu.*

A Concert in PostScript

Concertware+MIDI *4.00*

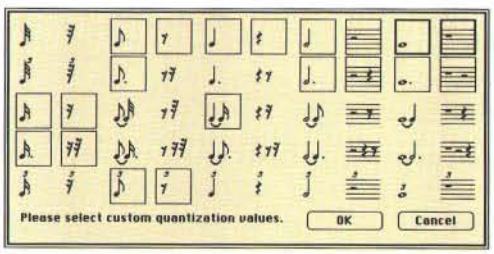
Music notation program. ***Pros:*** *Ease of use; fast conversion of MIDI input to notation; formatting flexibility; compatibility with Sonata (PostScript music font); lyrics automatically adjust spacing on reformatting.* ***Cons:*** *Some symbols missing or overly difficult to enter; only eight staves per system; no part-extraction capability; no way to tighten up spacing; difficult to override automatic transcription.* ***List price:*** *$149.95; $25 upgrade from* Concertware+ MIDI; *$70 upgrade from* Concertware+. ***Requires:*** *512K.* ***Copy protection:*** *None.*



Great Wave software's latest version of *Concertware+*MIDI is the first commercial program to let you print music played in real time (as opposed to step time or note-by-note) with Adobe Systems' revolutionary PostScript music font, Sonata. As in the earlier versions, the package consists of three applications and a collection of sample files, MIDI setups (for popular synthesizers), and instruments (for the Mac's speaker).

Inventory

Great Wave changed the Instrument Maker and MIDI Player portions of the program by grouping all instruments into a single library accessible by the three applications. The MIDI Player now has additional features: a volume control, displayed tempo changes ranging from 30 to 225 beats per minute, MIDI setup data, and synchronization to an external device via MIDI Sync. An interesting innovation is the ability to synchronize Macintosh-synthesized music to the external MIDI device as well.



Quantization
Concertware+MIDI *4.00 implements a new form of quantization upon input. Users specify an arbitrary set of note durations and rest values to which all MIDI input will be "rounded off."*

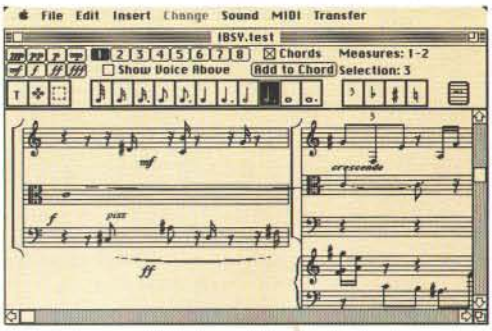
Most of *Concertware+*MIDI's new features are implemented in the Music Writer application. Music played on any MIDI keyboard in real or step time may be auditioned, rerecorded, or inserted directly into a score. Cut, Paste, Copy, Search, and other functions are easy to execute. For inputting from a MIDI keyboard, the new version adds the option of placing the symbol palette at the top of the screen. If you don't have a MIDI keyboard, you can input notes with the mouse or play them in real time on the Mac keyboard.

The speed with which *Concertware+*MIDI 4.00 converts MIDI data into conventional music notation is unparalleled, due in part to the software's ability to quantize upon input. In most MIDI sequencers, quantization is applied after a performance has been recorded. *Concertware+*MIDI 4.00 lets you preselect a set of rhythmic values; the program then rounds off all MIDI-supplied rhythmic data to match the nearest preset note values (see "Quantization").

Whereas earlier versions of *Concertware+* allowed only eight monophonic (single-note) melodies to appear on two staves, version 4.00 permits eight polyphonic (multiple-note) melodies, each with up to eight simultaneous notes, to be notated on up to eight staves. After entry, you can isolate any grouping of notes from chords, making quick work of delineating the melody or bass line. Furthermore, the developers have solved a problem that has plagued sequencer/notation packages from the beginning: individual parts may now jump from staff to staff at any point.

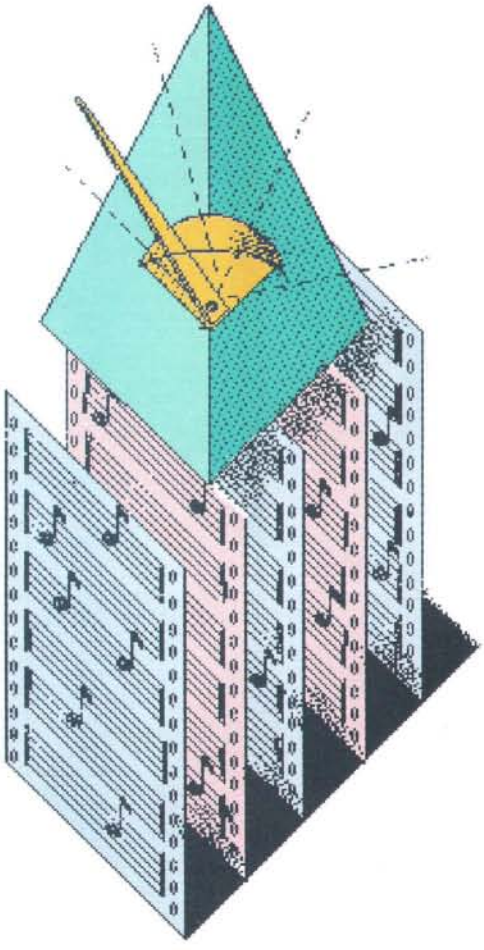
*Concertware+*MIDI's formatting options allow you to insert a ruler at any point (see "Formatting"). These rulers give you complete control over the spacing between staves and systems; over page, measure, and line breaks; and over brackets, braces, and clefs. These rulers also give you access to a number of powerful musical parameters. They allow you to determine the number of staves that are displayed and/or printed, to assign parts to particular staves, and to place dynamic (loudness) markings in the score.

Of course the best news is that *Concertware+*MIDI prints with Adobe's PostScript music font, Sonata. Because this font is not a bit-mapped character set, the output from a LaserWriter or other PostScript printer is much closer to publication quality than before, and ImageWriter printing is also vastly improved. (However, Sonata doesn't allow slanted beaming.) Although Great Wave supplies the screen fonts needed for Sonata, to download the actual font to your LaserWriter you must purchase the $95 downloadable version from Adobe—otherwise the printer merely creates a bit-mapped version of the screen fonts.



Formatting

Rulers analogous to those used in MacWrite *give you complete control over spacing between various elements and over the assignment of parts to a particular staff.*



Elegant Additions

For the more sophisticated user, version 4.00 offers MIDI Synchronization options that either "slave" the program to an external device (such as a sequencer or drum machine) or vice versa. While it has no SMPTE (Society of Motion Picture and Television Engineers) timecode lockup features, *Concertware+*MIDI's sync capabilities are fully functional and provide a great introduction to synchronization.

*Concertware+*MIDI handles text similarly to Mark of the Unicorn's *Professional Composer:* by using the Tab key instead of the spacebar, you can permanently attach words and syllables to specific notes. In this way lyrics automatically accompany the appropriate notes, despite changes to the score.

Educators or authors who want to combine musical examples with text can use the selection box to copy any portion of the screen and transfer it to a word processor. *Concertware+* files may also be saved as *MacPaint* documents for further polishing.

For the money, *Concertware+*MIDI 4.00 is the easiest way to output printed music to a PostScript printer. In spite of its superior printing capabilities, the program does have a few significant drawbacks. The eight-stave limitation may pose some problems, particularly for orchestral composers. Others will be dismayed to hear that the part-extraction capabilities found in earlier versions of the program, rudimentary as they were, have been removed. Some basic symbols such as crescendo and diminuendo are missing. Although you can add such performance instructions through the text option, you must invoke the program's esoteric MIDI Macro options to make MIDI instruments respond to these expressive markings. Because key signatures are global, you will have to take extra steps when you use a synthesizer to preview a score that is to be played on transposing instruments.

While not as robust in features as some of the more expensive professional music notation packages, *Concertware+*MIDI version 4.00 should be the choice for first-time MIDI musicians and anyone who needs quick-printed PostScript output from music played in real

time. Deeper in the program are powerful tools that can satisfy intermediate to advanced users as well.
–Christopher Yavelow

See *Where to Buy* for product details.

Piece of Mind

***Subli-Mac** 2.0*

Self-help program. ***Pros:*** *Easy to use; encourages relaxation and positive thinking.* ***Cons:*** *Hard-to-read manual lacks useful examples and makes many unsubstantiated claims; animation and subliminal displays are erratic.* ***List price:*** *$39.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

***Mac-ESP** 1.4*

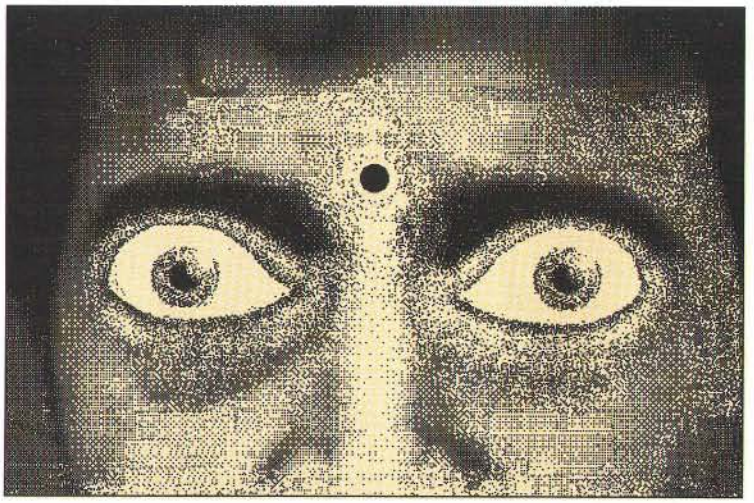
Self-help program. ***Pros:*** *Easy to use; encourages relaxation and concentration.* ***Cons:*** *Hard-to-read manual makes many unsubstantiated claims; lack of random selection makes objective testing difficult.* ***List price:*** *$49.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*



Remember the scandal when moviegoers of the fifties discovered that many films contained messages (You want popcorn) that flashed on the screen so fast they were invisible to the conscious mind? Remember the talk about how those messages went straight to your subconscious (Buy popcorn!), influencing your behavior without your knowledge? Well, they're back.

A new program from Psy-Den America Corporation, called *Subli-Mac,* promises to harness the power of subliminal messages to help you change your habits, develop new skills, and generally become the person you've always wanted to be. This time around, you can write the messages that you view subliminally. Once they're composed, you can save them and reprogram yourself as often as you like.

According to the manual, subliminal programming works best if you achieve a relaxed alpha state. To help you get there, *Subli-Mac* displays a series of colors on your screen that leads you from active red to calm indigo. The million Mac owners who don't have color monitors are advised to use colored cards or visualize colored images, by thinking, for example, "I am totally surrounded by red. I see tomatoes."



The Hypnotist
One of many sets of Subli-Mac *eyes watches you while your subliminal messages flash on the screen.*

Once you're *alpha*-betized, you meditate on a hypnotic pair of eyes, set in a partial face bearing a flashing "third eye" on its forehead (see "The Hypnotist"). You choose among several sets of eyes or geometric patterns. Whatever you focus on, you become aware of your messages briefly flashing at regular intervals. Just ignore them; they're talking to your subconscious, not to you.

The Ridiculous to the Subliminal

Can regular sessions with this program over an extended period of time really change your behavior? Maybe. Could you achieve the same results by regularly meditating on a handwritten or memorized affirmation? Probably. It would take an expensive, carefully controlled study to determine whether there's any advantage to subliminally programming yourself with *Subli-Mac.*

If you're more inclined to put your research dollars into extrasensory perception, you can try *Mac-ESP,* also from Psy-Den. You have to go into an alpha state first, using the same colorful techniques as you would with *Subli-Mac.* Once you're there, you bring up a screen with cards containing either the geometric shapes of the classic Zenner cards or descriptions of images of people and places. Choose one, click on it, and concentrate on the full-size image that appears on the screen. Then try to send a mental picture to someone across the room (or across town). Every few seconds the image on the screen inverts briefly to remind you to concentrate; otherwise, it behaves like an ordinary playing card.

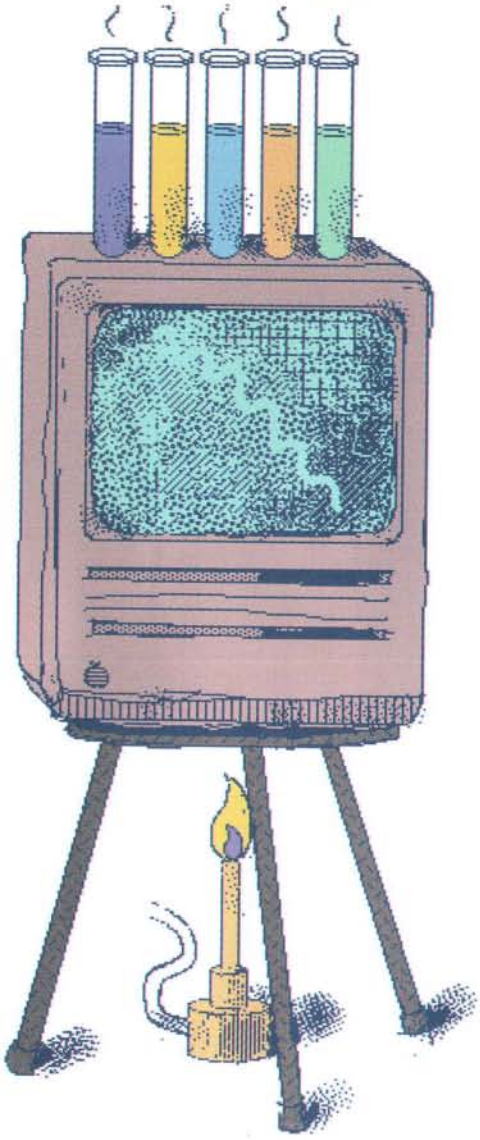
For scientific ESP study, a physical deck of cards might be better; it would allow for *random* selection of images, eliminating the possibility of the receiver second-guessing the sender's preferences. (The developer claims that random selection was intentionally left out because telepathy works better if the sender has freedom of choice; skeptics say intuition is not telepathy.)

Read My Mind

In case you haven't sensed it by now, I have a problem with these packages: hype. The company's ads, manuals, and online documentation are full of outrageous claims about how these programs can change your life or your business; they're virtually devoid of concrete references for anyone who's interested in seriously studying consciousness. I'd find it a lot easier to like these programs if they were marketed as entertainment packages or if they provided more references and examples to convince skeptics that they really work.

Personal computers have many positive applications in the arena of human potential; for example, they're widely used with biofeedback devices to help control stress. But I'm not convinced that *Subli-Mac* and *Mac-ESP* do anything that can't be done as well without a computer. Unless you're a collector of New Age paraphernalia or high-tech oddities, I recommend you spend your personal-growth budget on books, cassettes, or a workshop, instead of these programs.*–George Beekman*

See *Where to Buy* for product details.



Getting on the Bus

GPIB-SE

IEEE-488 instrument controller/coprocessor board for the SE. ***Pros:*** *Well-engineered controller for popular instrumentation bus; 68881 coprocessor and DMA options available; outstanding technical support.* ***Cons:*** *Inadequate documentation.* ***List price:*** *Controller board $495; DMA option $300; 68881 option $500.* ***Requires:*** *Macintosh SE.*

The single slot in the Macintosh SE and the wide-open architecture of the Mac II have relieved the problems of data acquisition and interfacing to scientific instruments. On older Macs the process required awkwardly kludged clip-on boards or serial-port schemes. While the Mac II is perhaps a more obvious choice for add-on board development (National Instruments has several Mac II cards), the SE's small footprint and lower price make it attractive for actual lab use. Since the SE has only one card slot, however, manufacturers of SE interfaces must provide all likely options—such as math coprocessors—on their boards.

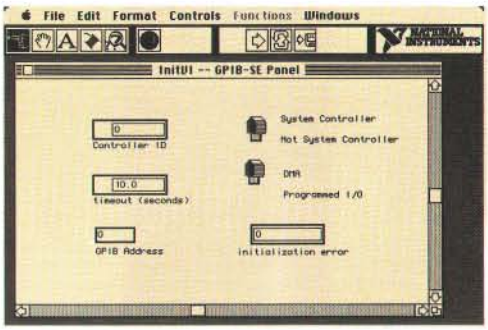
National Instruments has solved that problem with its multifunction SE card, which interfaces with instruments designed for the General Purpose Instruments Bus (GPIB), defined by ANSI/IEEE Standard 488-1978. The GPIB has been widely adopted for scientific instruments, including testing and measurement equipment. The convenient and well-documented interface has a data-transmission rate of up to 1 megabyte per second, making the GPIB-SE worth considering for nearly anyone who uses laboratory instrumentation.

Hooking It Up

Although the GPIB-SE can be installed by anyone with a Torx screwdriver and a modest amount of courage, only installation by an Apple dealer will preserve the SE warranty. National Instruments provides diagnostic software to check on the installation. Installation simply involves sliding the board into place and connecting the GPIB port to the SE's back panel.

A *LightspeedC* language interface is provided with the GPIB-SE, ensuring an economical route to data acquisition. For larger lab budgets, National's *LabVIEW* programming system ($1995) supplies an easy-to-use interface. Using *LabVIEW,* it took three hours to set up data acquisition from a Hewlett-Packard 1090 liquid chromatography system.

LabVIEW provides a prepackaged initialization screen (see "SE How They Run") for the GPIB-SE as a virtual (user-definable, software-based) instrument and offers a special set of program icons for managing communications on the IEEE-488 bus (see "Boxes, Little Boxes"). It also offers "canned" interfaces for a long list of standard laboratory instruments. For instruments on this growing list, all interface details are automatically handled when you select the virtual instrument corresponding to the lab hardware.



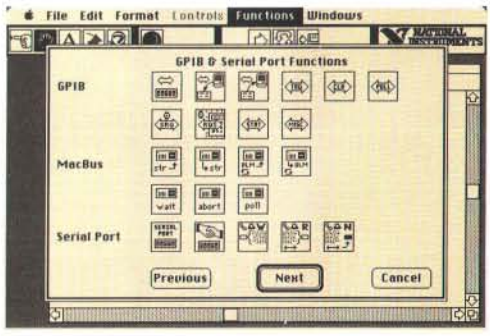
SE How They Run

Under LabVIEW, *the GPIB-SE board has its own start-up screen on disk. The user either calls up a prepared virtual instrument corresponding to the items of lab hardware or writes control strings according to IEEE-488 conventions.*

When the Chips Are Down

The 68881 option is highly recommended for using the SE as more than a simple data logger. For example, a standard Fourier Transform benchmark that requires 76 seconds without the math coprocessor takes 3.6 seconds with the 68881. The 68840 DMA controller, however, is necessary only for the highest-speed data throughput. With a directly programmed interface to appropriate instruments, the board can acquire data at 800 kilobytes per second in practice, pushing the limits of the GPIB bus standards. The DMA option can "snapshot" near-microsecond events, which makes it more useful to physicists or electrical engineers than to chemists or biotechnologists.

The IEEE-488 bus is currently the most useful laboratory data system, and



Boxes, Little Boxes

LabVIEW *also implements icons for the standard GPIB bus control statements. Although* LabVIEW *itself becomes the rate-limiting factor in data transfer at very high speeds, it allows GPIB-SE interfaces to be strung together in hours instead of weeks.*

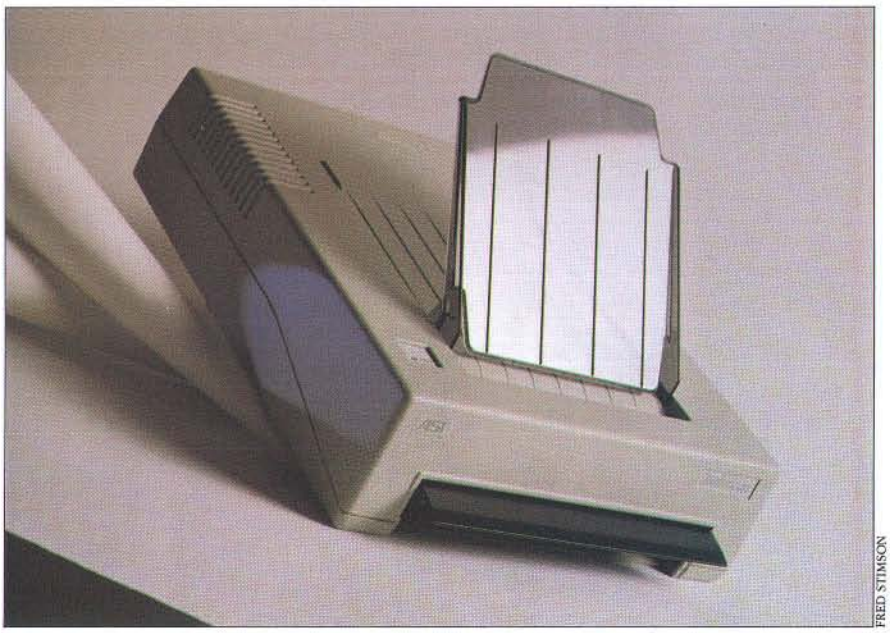
National Instruments' GPIB-SE board turns the SE into a self-contained lab workstation for use with hundreds of instruments. The board can be programmed through its C interface or with the relatively expensive convenience of *LabVIEW*. The review card tested was well designed (no last-minute wiring patches), and the local distributor reported no problems in the several hundred cards it has sold for PCs and Macs. *–Charles Seiter*

See *Where to Buy* for product details.

A New Image

AST TurboScan

Image-scanning hardware and software. ***Pros:*** *Gray shades with selectable halftone/line art and halftone patterns; simple setup and scanning procedures.* ***Cons:*** *Inadequate editing software.* ***List price:*** *$1899.* ***Requires:*** *512KE; hard disk for full-page, high-resolution scanning.*



FRED STIMSON

As the ability to detect and represent more shades of gray becomes commonplace in reasonably priced scanners, digitized images are beginning to be smooth and accurate enough for some serious publishing applications. A prominent member of this newer scanner crop, AST's TurboScan, is now available for the Macintosh. With the Microtek scanner engine at its heart and an innovative but unpolished Mac software package for its brain, TurboScan produces high-quality halftone images, although it makes the process somewhat more difficult than it should be.

Getting Acquainted

TurboScan is lightweight (18 pounds) and reasonably compact (15 by 17 by 4½ inches). The only control is a power switch. The back panel is also fitted with two clearly labeled serial and parallel ports. The only differences between the IBM PC and Mac versions are the interface cable and accompanying software. Cabling for both types of Macintosh serial ports (8- and 9-pin) comes with the Mac version.

TurboScan is also easy to set up. Instead of the flatbed design used in scanners like the Hewlett-Packard ScanJet, AST chose a sheet-feeding design; a set of rubber wheels pulls your document through the device. After attaching the serial cable, all you have to do is insert a plastic paper guide into a couple of slots on top of the unit.

Planning Your Scanning

The scanning process is controlled entirely by the SuperScan software. As you'd expect, the program lets you set contrast, brightness, and resolution (from 75 to 300 dots per inch, with many intermediate settings), but it also lets you choose between line-art and halftone modes. You use the line-art mode for text, line drawings, or any image with few and/or contrasting shades; the halftone mode is for images (such as photographs) that have continuously variable shading.

TurboScan's engine is capable of detecting 16 separate shades of gray, which you can display or output in any one of 12 halftone patterns. The mouse lets you define the exact area on the page to be scanned, and you can split that area into separate portions for the line-art and halftone modes. Finding the optimum combination of all these settings can be a laborious process of trial and error, but the defaults usually produce acceptable results even while you're learning.

Feeding the Beast

TurboScan's traction feeding mechanism works smoothly, but unlike a flatbed scanner, it can't scan anything thicker than .012 inch. Nor can you feed in documents larger than 8½ by 14 inches. Using very thin paper also proved difficult; it often wrinkled in the rollers. Fortunately, it's easy to free jammed documents.

Slight but noticeable misalignment is another occasional problem that results in scanned images no longer being square on the page. Finding the correct alignment for irregularly shaped documents is purely a matter of luck.

To compensate for high-resolution scanning's voracious appetite for memory, SuperScan's virtual-memory system swaps out portions of the image to disk as needed during scanning or editing. Even with a hard drive, however, the process is exceedingly slow.

Hidden Dangers

Once an image is safely in memory, you can modify it with SuperScan's built-in graphics editor (a no-frills paint program), but not with scanning settings such as brightness or halftone patterns. Most of the standard *MacPaint* tools are provided, but some features you'd expect to find are missing, especially when it comes to selected blocks. You can't rotate an image

fragment in a block, and there's no way to resize or move the block beyond the area of the image currently visible on screen, except via the Clipboard.

SuperScan has other aggravating rough edges as well. With all but the lightest continuously shaded graphics, when you reduce the screen view of an image, it turns into an illegible sea of black that's worthless for editing. Worse yet, if there's not enough room left on your disk during virtual-memory disk swaps, the program unceremoniously crashes, as it also occasionally does for more mysterious reasons.

SuperScan's file-export facilities are adequate–in addition to its own proprietary format, you can save images in *MacPaint* and TIFF formats, and as standard or gray PostScript text files (for output on high-resolution Linotronics and similar devices).

With its gray-scale support and flexible halftone capabilities, scanned images produced with the TurboScan package are at least equal in quality to the output of any other competing scanner. Before you buy, however, be sure you can live with the limitations of the sheet-feeding mechanism and SuperScan's bugs and missing features. *–Steve Cummings*

See *Where to Buy* for product details.

QUED Pro Quo

***QUED/M** 2.04*

Text Editor. ***Pros:*** *Powerful, feature-packed text editor with macro facility.* ***Cons:*** *High learning curve for advanced features; manual complete, but dense.* ***List price:*** *$119.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

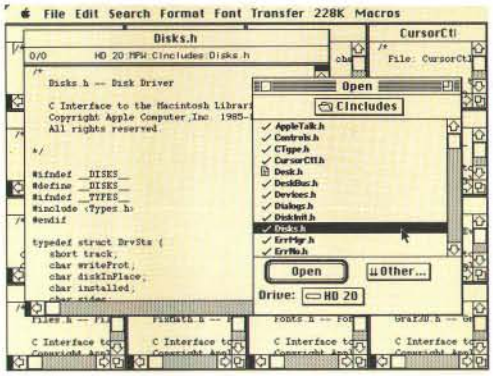


While the Macintosh allows tremendous flexibility in how printed words appear, developers haven't had the same sort of flexibility in manipulating those words before they are printed. Paragon Concepts' first version of *QUED (QUality Editor for Developers)* made it easier for developers to create and edit their source code. Now, two years later, that program has evolved into *QUED/M* 2.04 *(QUality EDitor with Macros),* a powerful tool that should find even wider acceptance.

Mucho Memory

QUED/M is a memory-based editor, which means that it keeps the entire document it's working on in memory all the time. It's capable of working on as many documents at one time as will fit in memory.

The drawback of a memory-based text editor is that document size is limited by available RAM. On a Macintosh Plus with 1 megabyte of memory, though, this means a document size limit of about 300K–not a bad trade-off when you consider the outstanding speed of this memory-based editor. Also, RAM prices are coming down rapidly; soon 2.5MB and 4MB Macs will be commonplace. By automatically taking advantage of available RAM *QUED/M* will handle documents larger than you'll probably ever need, even if you have a 4MB Mac Plus or even an 8MB Mac II.



QUED/M's Window Tiling
QUED/M *allows you to work easily with many documents simultaneously.*

Custom Editing

QUED/M allows you to select and open multiple documents simultaneously through its custom standard-file dialog box. It permits easier document management, too, by letting you either stack or tile the windows on screen (see "QUED/M's Window Tiling"). You can view documents in your choice of font and size, and optionally display line numbers, ASCII codes, and character/word-count information. It also lets you place invisible markers within your text, making it simple to jump instantly to a designated place in your document.

With *QUED/M*'s Find and Change commands you can search your document for text strings and change them. In addition, the program supports regular expressions, so you can search not only for literal text strings but also text patterns with one command. Text searches can take place within a current document, across all open documents, or across selected unopened documents on a disk.

Features Galore

For programmers, *QUED/M* keeps track of matching parentheses throughout a document. It can search through a document and alert you to any unbalanced parentheses, or optionally alert you to unbalanced parentheses as you type. *QUED/M* also lets you define your own "parentheses," allowing it to keep track of matching marks including " ", ' ', [ ], and {}, as well as notations specific to programming languages, like begin/end pairs in Pascal and /* */ comment delimiters in C.

Another unique feature of *QUED/M* is its ability to "fold" text, much like an outline processor does. By simply selecting a range of text and the command Hide Text, you can represent that range of text by its bulleted first line only. As with an outline processor, clicking on the bullet enables you to expand and collapse the text. This feature is useful for compressing longer documents or for showing only headings or function names in source code.

QUED/M has many more features, including synchronized scrolling and the ability to compare two documents. But its macro facility is what truly sets it apart from other commercial text editors. Nearly every command within *QUED/M* is also available as a macro command. When you take into account this editor's regular-expression support, the amount of flexibility you can have in writing macros is truly remarkable. As part of the package, Paragon Concepts includes over 50 sample macros that demonstrate the program's capabilities.

QUED/M's abundance of features lengthens the learning curve for users. Fortunately, the number of features does not get in the way of taking advantage of the program's power. There are a few diversions from the standard Mac user interface (like the custom standard-file dialog box), but many of these contribute to the program's extended functionality. *QUED/M*'s manual is quite complete, but the descriptions of features are packed into it almost as tightly as the features are packed into

the program. A longer tutorial section would be helpful.

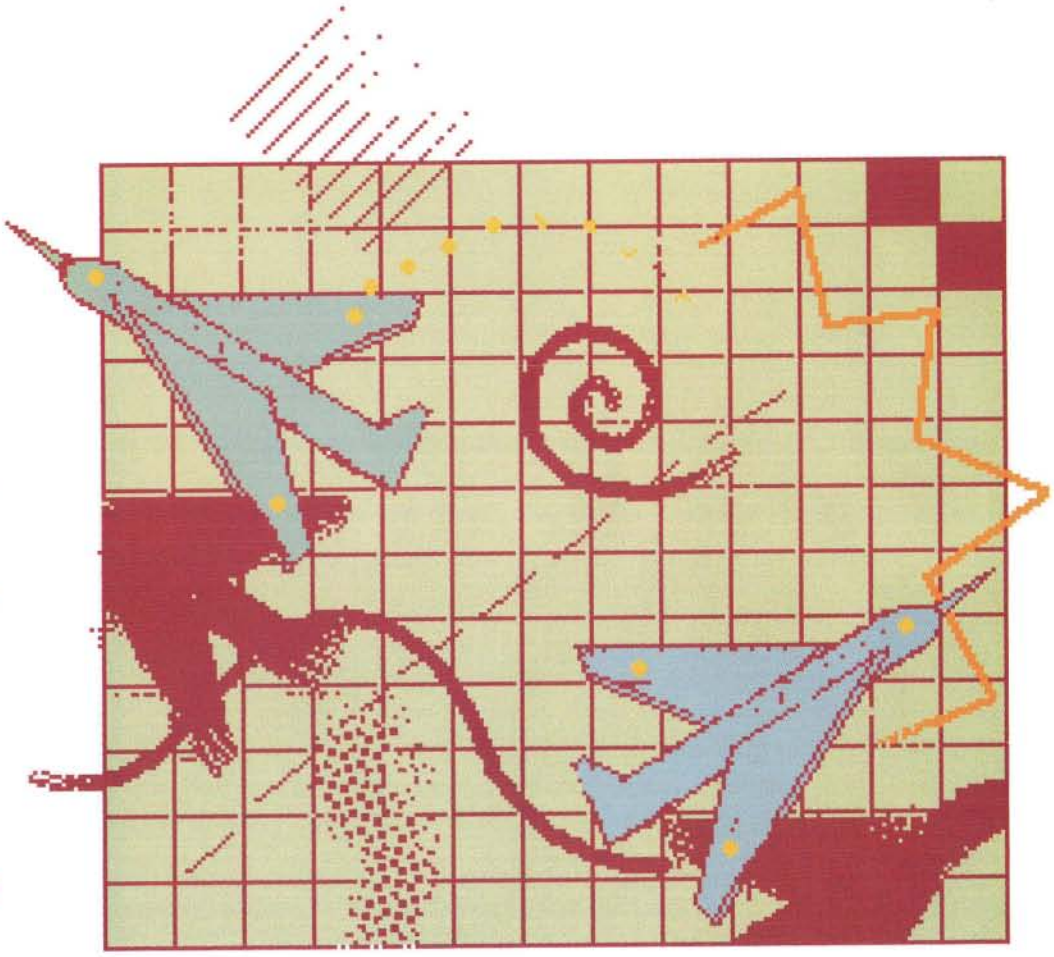
To say that this program has a lot of features is an understatement. *QUED/M* is among the most powerful Macintosh text editors available, including those bundled or integrated into some development systems.—*Jim Takatsuka*

See *Where to Buy* for product details.

Fry the Unfriendly Skies

Tactical Jet Fighter *1.0*

Flight simulation game. ***Pros:*** *Very simple to begin playing; provides no-frills combat action.* ***Cons:*** *Eliminates critical real-life aviation and combat hazards; does not provide complete takeoff-to-landing simulation.* ***List price:*** *$44.95.* ***Requires:*** *128K.* ***Copy protection:*** *Key disk.*



Tactical Jet Fighter is an air-to-air/air-to-ground combat game with simplified flight simulation features. This stripped down, straightforward shoot-'em-up assumes that you're not interested in learning all the details of flying an airplane before nose-diving into action. Although some skill-building time is required, particularly for players with no previous flight simulation experience, learning is relatively quick; many complicated actualities have been left out, so you can begin play almost immediately. There is no scoring system, but the game's 16 missions maintain a fast enough pace to hold the action-crazed attention of many Top Guns, if not of the more demanding connoisseurs of flight simulation.

Simplicity over Sophistication

You don't have to worry about takeoffs or landings—*Tactical Jet Fighter* is combat action without the down time. Each of the game's attack missions begins in the air, in a world approximately 100 miles square where there are stationary targets on land, sometimes protected by enemy jets, as well as other sketchy little shapes representing enemy tanks, railroad cars, and PT boats. Destroying all ground targets is the objective of each mission.

This game's Mach 1.5 jet will do wonders for your military budget—it comes with unlimited fuel. And like Rambo, *Tactical Jet Fighter* pilots never run out of cannon ammo, rockets, bombs, and guided missiles, though there are limits to how many weapons you may fire at once. As a further incentive to uninterrupted play (eliminating irritating restarts), you can fly smack into the ground and then take off again without being killed. Designed to keep the war machine going and the fun simple and nonstop, these features unfortunately also tame the contest considerably.

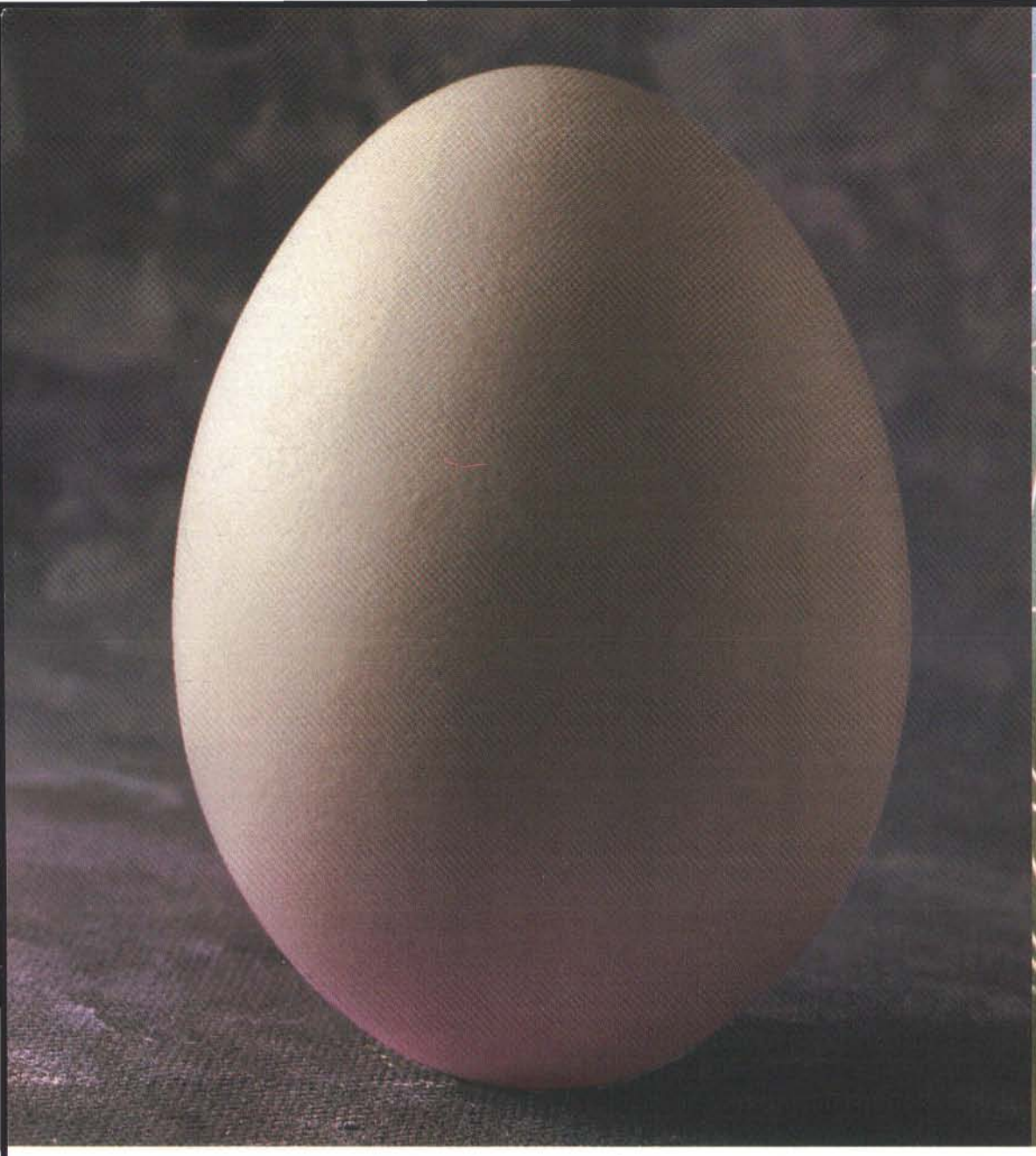
Limits and Flaws

Tactical Jet Fighter runs at good speed on the Mac 128K and 512K. But the programming priority of a quick frame rate also prohibits sound and reduces graphic detail. *Tactical Jet Fighter*'s on-screen aircraft control panel is a recognizable version of the real thing; the mouse functions as the pilot's joystick, and keys on the keyboard serve as controls. Four weapons systems are arrayed, as well as short- or long-range radar, pilot's viewpoints, throttle, brake, and landing gear (which is used for braking but not for landing). There is no keyboard option for stick control and no means to adjust the amount of tension or play in the stick, nor are there menus for customizing anything else. Simplicity cuts both ways.

Although *Tactical Jet Fighter*'s instruction manual admits it is different from "hi-fidelity flight simulation," it remains true that a lot more of everything is packed into the best-selling *Microsoft Flight Simulator,* including a realistic World War I dogfight. *Flight Simulator* can provide real pilot training, too, but it is not simple. If you burned out on Silicon Beach's *Airborne* but still need a fix of fast-firing action, you may enjoy the *Tactical Jet Fighter* workout, especially if it turns up at a discount price. Those who want more substantial graphics and sophisticated flight simulation should look elsewhere.

The fatal flaw (or nonfatal flaw) of *Tactical Jet Fighter* is that its pilots don't risk being shot down. You cannot be destroyed in a crash, stall during takeoff, or go into a spin after being hit. *Tactical Jet Fighter* is a thinly drawn game of target tag in which the player is "it," the target is usually stationary, and the enemy never shoots back. Rambo wouldn't even grease up for this one.—*Keith McCandless*

See *Where to Buy* for product details.





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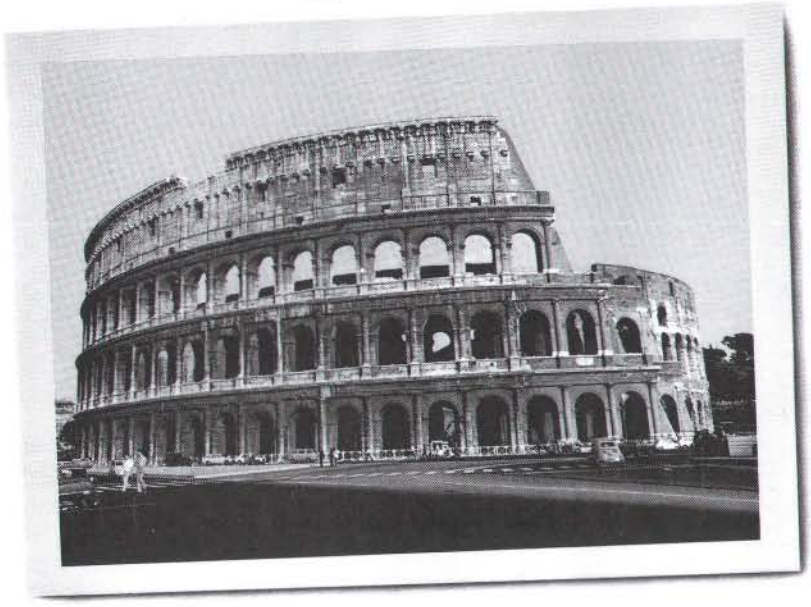
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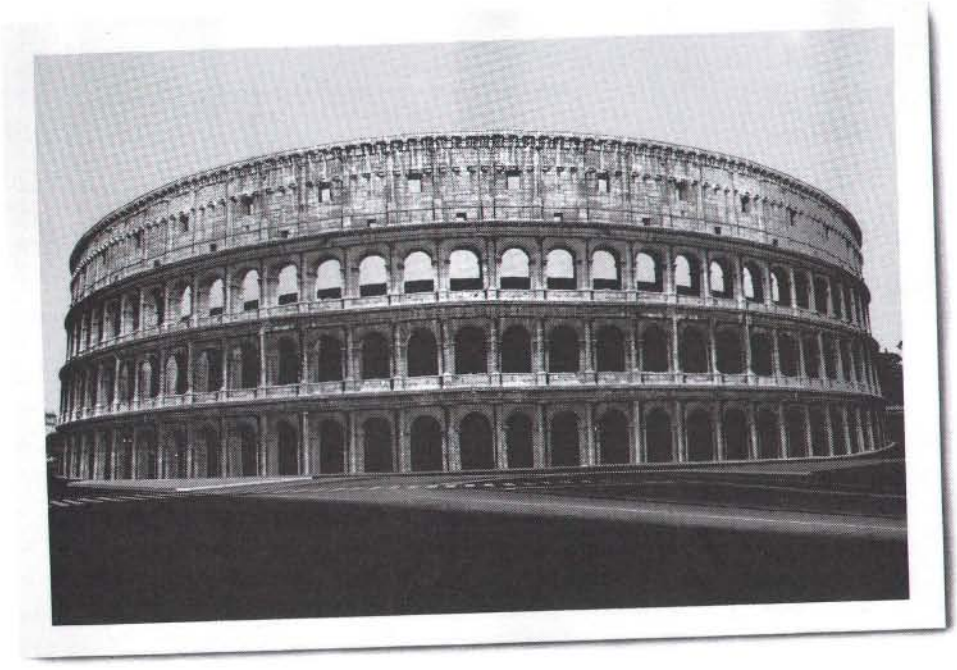
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Circle 278 on reader service card

New Products

Information on the Mac's latest software, hardware, and accessories

Edited by Eileen Drapiza

This section covers Macintosh products formally announced but not yet evaluated by *Macworld*. All prices are suggested retail. Please call vendors for information on availability.

SOFTWARE

Apache Strike and Beyond Dark Castle *Strike* allows the player to fly a McDonnell Douglas AH-64 Apache attack helicopter in between skyscrapers, fighting enemy helicopters, jets, and tanks while seeking out the enemy's strategic-defense computer. 3-D animation. In *Beyond Dark Castle* the hero battles through chambers filled with obstacles and bad guys. 512KE min. memory. $49.95 each. Silicon Beach Software, 619/695-6956.

Arrow Dynamic and Caspian PostScript Font Families The Arrow Dynamic family includes regular, bold, and heavyweight arrow sets featuring various background styles; accounts for all eight major compass points. Caspian is a calligraphic serif face. $43 per disk. EmDash, 312/441-6699.

Carousel Color Slide Software Design 35mm color slides from *MacDraw* and compatible object-oriented applications. Select from 256 colors per palette. Optional processing service provides 48-hour delivery. 512K min. memory; requires 1200-baud modem. $249. 20/20 Data Systems, 512/454-2508.

ColorLab Presentation program displays up to 256 colors on the Mac II, or transfers to 35mm color slides with a film recorder. Features include sorting, full centering, a transparent show-through option, and text coloring. Controlled or continuous operation. 1MB min. memory. $495. Language Systems Corp., 703/478-0181.

Comic People Clip art for use with *The Comic Strip Factory* or other *MacPaint*-compatible graphics programs. Contains seven new characters and an office background. $39.95. Foundation Publishing, 612/935-4230.

Complementary Type PostScript fonts for display, body copy, and borders: Highland Gothic, Highland Gothic Light, Fatti Patti, Vertigo, Cut Outs, Nouveau, Kasse, Hobnob, Fletcher Gothic, Peruta Medium and Light, Calculus, Michelle, Bodette Borders. Each disk contains at least two faces. $69 per disk. Software Complement, 717/491-2492.

Cricket Presents... Color presentation program. Integrates text handling and drawing tools; imports PICT files. 512KE min. memory. $495. Cricket Software, 215/251-9890.

Cyclesoft Training log for bicyclists. Includes calendar for setting goals; generates progress reports and charts. 512K min. memory. $49.95. Game Plan, 714/949-9599.

Desktop Publishing Type & Graphics *HyperCard* stackware version of the reference book. 1MB min. memory; requires *HyperCard*. $15. Publishing Resources, Inc., 303/442-1100.

Dessert Sampler Collection of 200 Mac graphics on disk. Available in a variety of formats. One-year subscription $249.50; includes catalog and disk. Moby Disk, Inc., 303/948-2678.

Different Drummer Lets your Mac become a drum machine, complete with snare and kick drum; ride and splash cymbals; high hat closed and open; tom lo, med, and hi; bell; hand clap; shaker; cowbell; and wood block. Records drumbeat patterns. 512K min. memory. $99.95. Primera Software, 415/525-3000.

FB Pro and TX81Z Pro Editor/librarian package for Yamaha's FB-01 and TX81Z synthesizers. FB Pro $129, TX81Z Pro $139. Digital Music Services, 714/951-1159.

ForeRunner Scripting utility for creating batch files. Bundled with Lock Out and Fast Formatter. 512K min. memory. $49.95. Beyond, 602/888-8667.

GraphPainter Presentation graphics program with curve fitting. 1MB min. memory. $50. Greg Brasel, 314/256-3317.

GYST Client-management database. Preset screens and data-entry fields may be customized. Includes an integrated appointment calendar/clock. 512K min. memory. $199. Contact Systems, Inc., 404/953-8242.

Handwriting Analyst Questions user about handwriting-sample shapes and formations, then analyzes and reports on writer's emotional characteristics, intellectual style, personality traits, social behavior, and vocational implications. 512K min. memory. $49.95 plus $3 shipping and handling. Ciasa, 415/644-2771.

HeadStart Customizable business database template for *dBase Mac*. Structured for personnel management, sales, marketing, accounts receivable/payable, and inventory. 1MB min. memory; requires *dBase Mac*. $169. DigiCorp, 801/562-2227.

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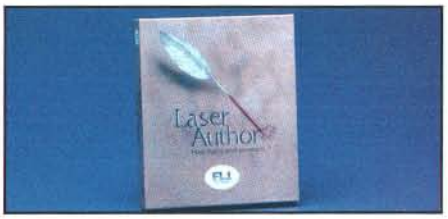


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Inside Out Database toolbox for programmers. Supplied in linkable object code; includes a set-up program for defining database schema. 1MB min. memory. Single-user program tools $395, multiuser program tools $595. Shana Enterprises, 403/438-6548.

Insight Inventory Control, Multi-User Modules, and OneWrite *Inventory Control* monitors stock levels and maintains inventory valuation. *Multi-User Modules* allows several users to work on records simultaneously. *OneWrite,* modeled after the balance-forward accounting method, is intended for small service companies. 512KE min. memory. *Insight Inventory Control* $595, *Insight Multi-User Module* $895, *Insight OneWrite* $299. Layered Inc., 617/242-7700.

Jam Session Lets inexperienced players create and record professional-sounding music on the Mac. 512K min. memory. $49.95. Brøderbund Software, 415/492-3200.

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MacLinkPlus/Wang VS Provides complete access to the Wang VS system. Includes Wang VS workstation emulation, and file-transfer and document-conversion capabilities. 1MB min. memory. $395. DataViz, 203/866-4944.

McMax dBase-compatible database-management system. Supports Microsoft formats. 512KE min. memory. $295. Nantucket Corp., 213/390-7923.

On Call Interactive medical adventure game with text, sound, and animation. 512K min. memory. $15. Goose Creek Software, 803/553-1805.

PageMaker Portfolio: Designs for Business Communications Package of 18 templates for proposals, memos, overhead transparencies, reports, handbooks, and business plans. 512K min. memory; requires *PageMaker.* $99. Aldus Corp., 206/628-2375.

PIXymbolsKeys and PIXymbolsTwo *PIXymbolsKeys* consists of downloadable PostScript pictorial fonts as well as screen fonts of all Mac-keyboard keys. *PIXymbolsTwo* includes more than one hundred additional characters. 512KE min. memory. $50 each. Page Studio Graphics, 602/839-2763.

Plundered Hearts Interactive romance fiction set in the seventeenth century. You are a young woman voyaging on a schooner bound for the West Indies. $39.95. 512K min. memory. Infocom, 617/492-6000.

PsychroMouse Engineering software that calculates psychrometric properties for cooling loads. 512K min. memory. $79.95. TechWare, Inc., 816/782-1249.

Rendezvous Electronic calendars in 12-month-perpetual, weekly, and 24-hour-day formats. Records notes in a centralized database; has search capability. Includes an automatic appointment reminder and a mini word processor. 128K min. memory. $200. PMC Telesystems, 604/255-9949.

StatView II Statistical data analysis and color graphics package for the Mac II. Analyzes a full range of statistics at mainframe speed; lets you customize graphs. Requires Mac II or SE/Plus with 68881 coprocessor. $495, demo disk $15. Abacus Concepts, 415/540-1949.

Super 3D 3-D color graphics modeling and animation for professional engineering and graphic arts applications. Rendering tools include perspective, hidden-surface removal, shading, color, and sophisticated shapes. Enhanced version takes advantage of Mac II color capabilities and the 68881 math coprocessor chip. 512KE min. memory. *Super 3D* $295, *Super 3D Enhanced* $495. Silicon Beach Software, 619/695-6956.

Trust & Betrayal: The Legacy of Siboot Interactive science fiction in which players strive to acquire power. 512K min. memory. $49.95. Mindscape Inc., 312/480-7667.

HARDWARE

The Big Picture for the Mac II 32-bit video controller and an ECL video signal. 17-inch monitor with 1024- by 808-pixel resolution; paper-white phosphor. Video card and monitor $1995, video card $795. E-Machines, 503/692-6656.

JDL-850 GL+ Plotter for 2-D/3-D drafting applications. Produces color plots on media up to 18 by 24 inches; handles shading, dithering, and polygon-fill tasks required in 3-D modeling. $3845. JDL Inc., 805/495-3451.

LaserView for Mac II Displays four shades of gray and two resolution modes: 1664 by 1200 pixels, or 832 by 600 pixels. Landscape mounted; paper-white phosphor; 75-KHz scan frequency. Refreshes at 60 Hz, noninterlaced; 160-MHz bandwidth. 15-inch screen $1595, 19-inch screen $2395. Sigma Designs, 415/770-0100.

MacADIOS II Ten boards for scientific and engineering applications, such as laboratory data acquisition, speech analysis, signal generation and analysis, and external process control and monitoring. $1500 to $10,000. GW Instruments, 617/625-4096.

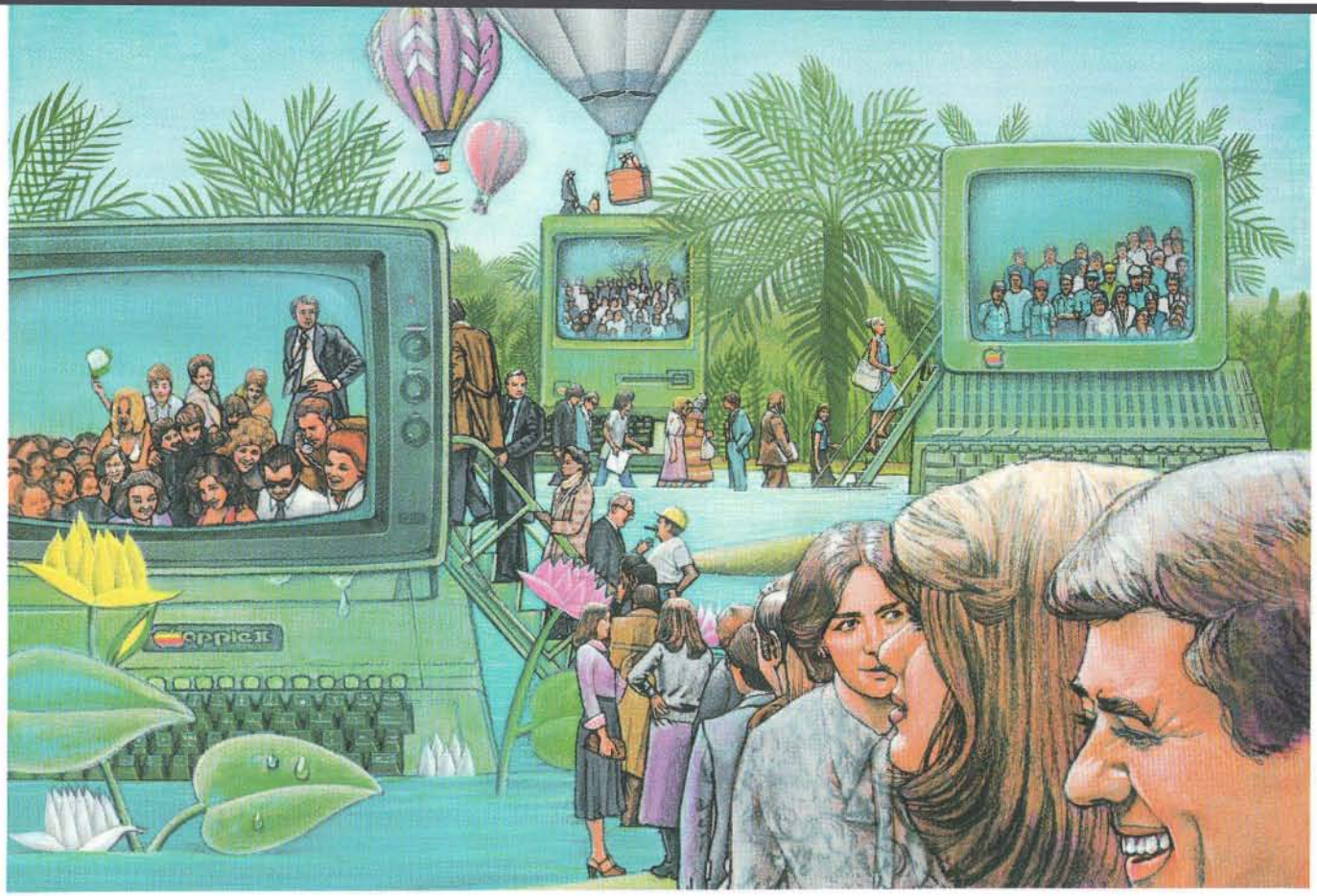
Mac&Touch Glass touch screen with mouse-compatible software driver. $995. MicroTouch, 617/935-0080.

MacPBX Integrates a Mac with any PBX system. Controls phone lines from Apple menu. Includes telephone-line interface. $249. Computer Phone Solutions, 305/653-4500.

Moniterm Viking 1 19-inch monochrome monitor for Mac SE. 1280- by 960-pixel resolution. 66-Hz refresh rate, noninterlaced; features extend, magnify, and WYSIWYG display modes; hardware screen saver. $1995. Moniterm Corp., 612/935-4151.

MSC Color Display Card 1280 by 1024 pixels, 32 bits per pixel. One, two, three, or four color planes of 8 bits each, RGB, and YMCK color processing; vertical refresh from 40 to 70 Hz, software-selectable; RGB Sync standard output (fourth channel optional); genlock and three or four inputs for frame-grabbing. External add-on hardware fully supported. Approximately $2500. Micro Systems Consultants, 818/997-0408.

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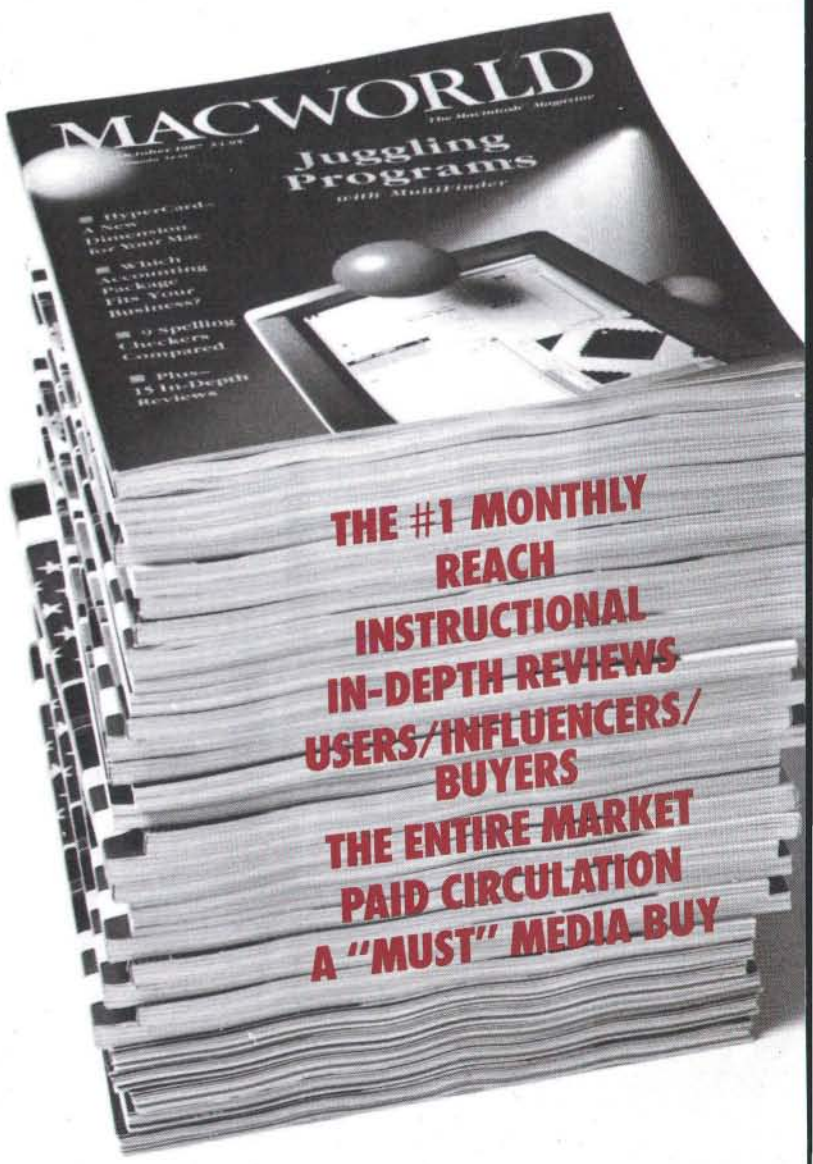
Macworld, of course, leads the way and is the #1 monthly Macintosh periodical with a circulation reaching 200,000 in January. It's aimed at all educated business market users: From government to universities, from science to home to businesses of any size. It's instructional, with an average of 20 in-depth product reviews per month. It's comprehensive, with departments including Macworld News, Verbatim, New Products, a variety of "how to" articles, Macintosh Best Sellers, even Where to Buy information. Because of all this, it's become a "must" media buy in reaching the wide Macintosh audience.

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PC Viewer Casts Mac screen image onto overhead projector. 640- by 480-pixel resolution. PCV 6448AV $1695, PCV 6448C $1895, PCV 6448C+2 $2495. In Focus Systems, 503/645-1551.

ProViz Video digitizer for desktop publishing. Produces screened halftones in PostScript output from any standard NTSC video source. 1MB min. memory. $1595. PixeLogic, 617/438-5520.

The Shadow Subsystem Two 86MB or 170MB fixed Winchester drives with two controllers and two power supplies and switches. Simultaneously writes data to both disks, but reads from only one. 30-ms average access. Model S0305-01 (86MB) $4395, model S4406-01 (170MB) $5995. Century Data Systems, 800/262-6743.

TransLink Transputer Modular parallel processing system for the Mac SE or II. Each T-800-based translink module has the processing power of a VAX 8600 (10 mips). Consists of TransLink boards, processor modules, and complete set of software development tools. Price to be announced. Levco, 619/457-2011.

ACCESSORIES

AutoInker Reinking machines for printer ribbons. Includes 2 oz. of ink. Dedicated reinker for ImageWriter $39.95, non-dedicated reinker $59.95. V-Tech, Inc., 215/822-2989.

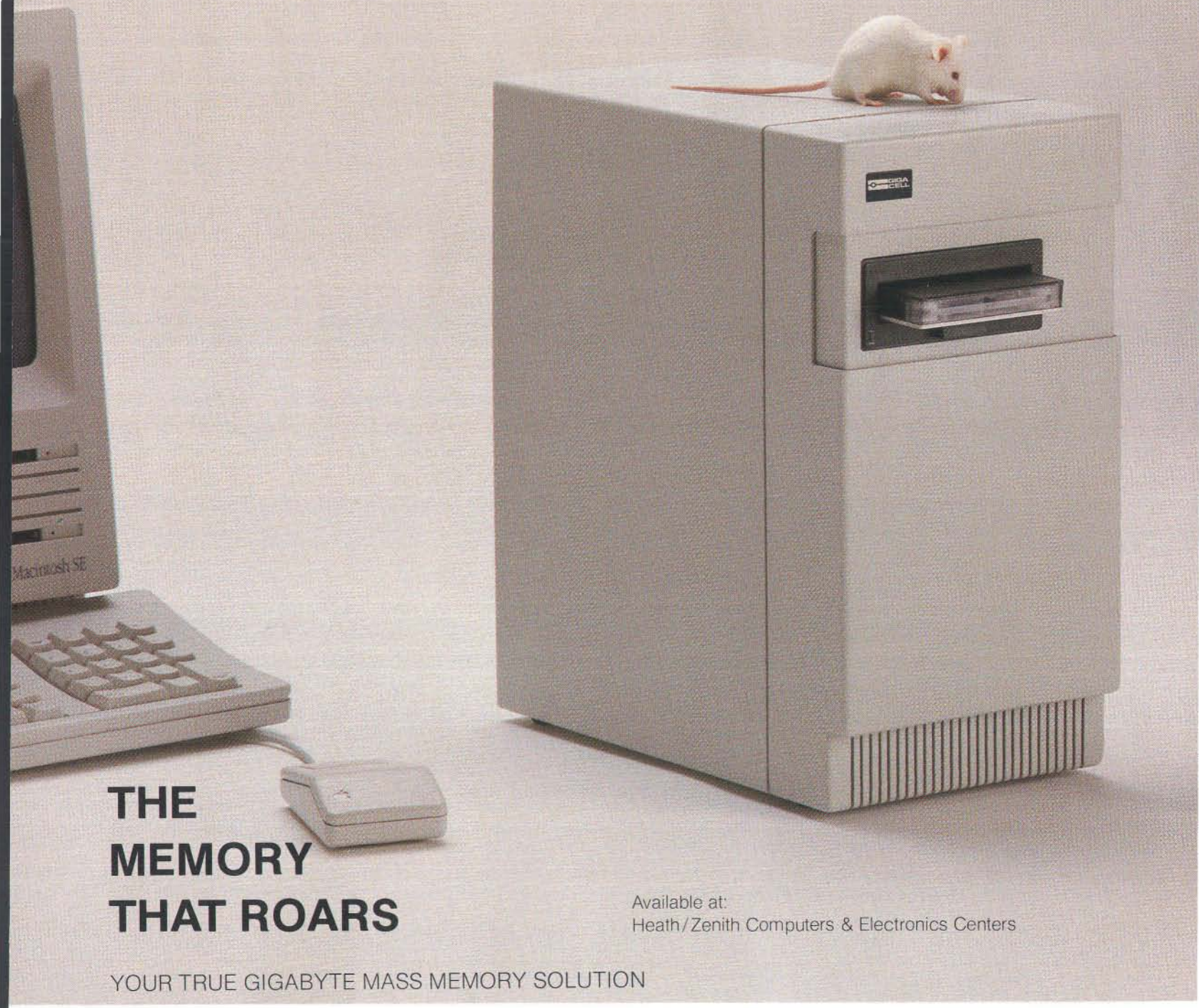
Data Interrupt Eliminators Prevents accidental data loss when modems and telephones are used on the same line. Disables extensions while modems are used. $9.95 to $11.95. Data Spec, 818/993-1202.

MacAmber Screen Enhancer Filter for Mac Plus and SE changes the display to an amber color; reduces glare and ultraviolet radiation. $29.95. Sideways Solutions, 415/865-5357.

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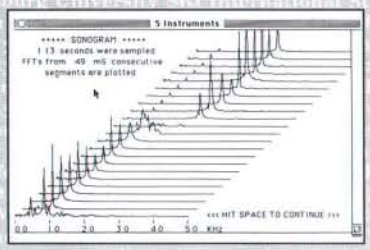
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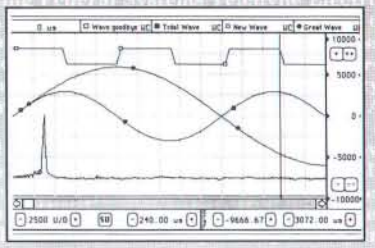
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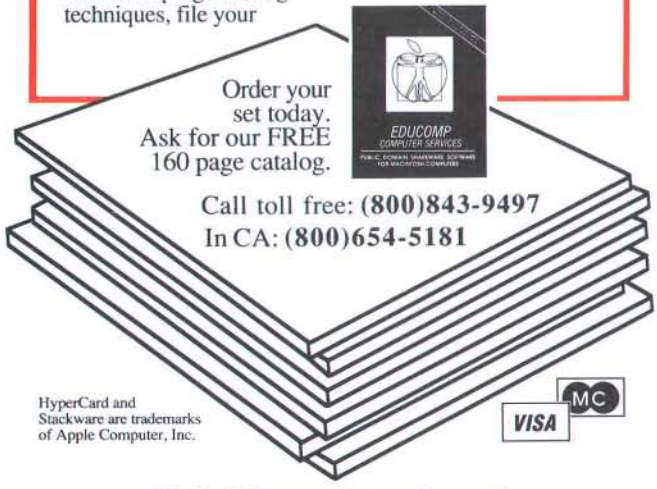
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New Products

The Macintosh Valet A flexible, rotating arm that holds the Mac's mouse, disk drive, and keyboard 6 to 8 in. above desk surface. Platform rotates 90 degrees to left and right; arm extends to a 36-inch radius. Steel construction. $139.95. MicroComputer Accessories, 213/301-9400.

Mandale Power Shield Lightning and surge protector for complete electrical and electronic systems. $199.95. Mandale Corp., 919/376-9570.

ProTech Laser Ultra and Envelopes White glare- and curl-free paper for laser imaging. Coated for wax pasteup. Slightly oversized #10 envelopes in bright white let you print graphics and text in one pass on front and flap. Adhesives are heat resistant. 250 sheets of Laser Ultra $20.95, 100 envelopes $15.75. James River Corp., 800/521-5035.

Quickcolor Formats Partially preprinted paper for overprinting. Accommodates a #10 trifold brochure, pamphlet, or self-mailer, with solid wraparound background color on the front and back panel. Colors include: Newport Blue, Kentucky Green, Georgetown Gray, and Cambridge Red. 100 sheets $9.95, 400-sheet rainbow pack $29.95. Intergraphix Corp., 617/331-8088.

TLP-2 Telephone-line/modem voltage surge protector. Plugs into standard three-prong AC wall outlets. Dissipates up to 6000 volts, 14,000 amps, 142 joules of surge energy. $39.95. Kalglo Electronics Co., 215/837-0700.

Wing Color Pack Adds colors to laser-printed documents. Includes materials for treating up to 50 pages. No additional hardware or software required. Starter pack $39.95. Wing Color, 800/541-0900. □

To have your product considered for inclusion in New Products, *send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor,* Macworld, *501 Second St., San Francisco, CA 94107. We reserve the right to edit press releases.*

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*Mr. Buckley volunteered this statement about Word Finder, and is not being compensated for his endorsement.

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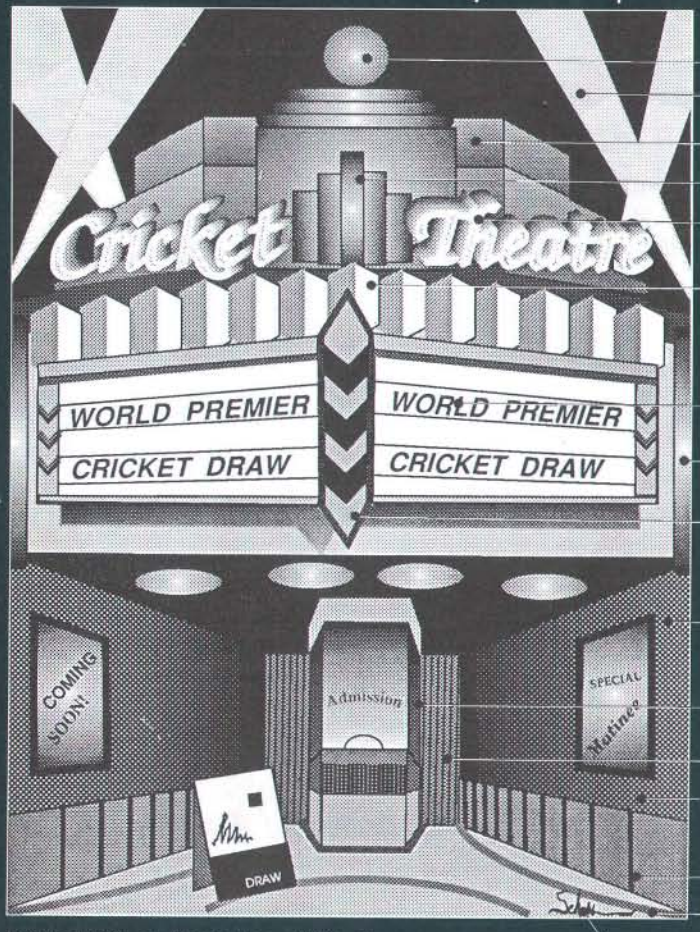
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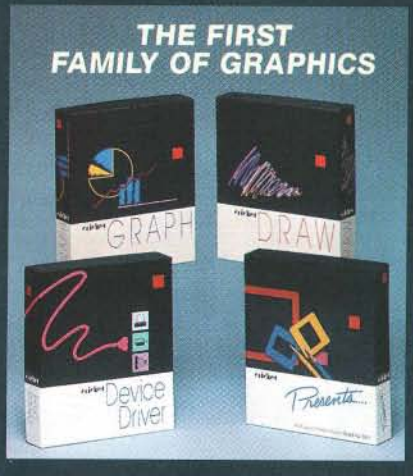
Cricket Draw's most universally acclaimed capability is its special effects generation. A quick glance at the example at left will give you a feeling for what can be accomplished with a little imagination and Cricket Draw. Graded Tones (fountains), Shading, Text on any path — all these effects and more are simple with Cricket Draw.

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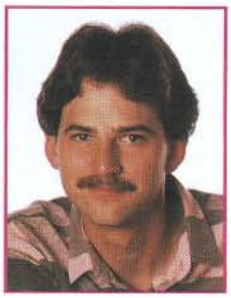


When it comes to Macintosh graphics software, there's just one name to remember — Cricket Software. Your local dealer will be happy to introduce you to the entire family: Cricket Graph, Cricket Draw, Cricket Presents. . . , and Cricket Device Drivers.

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Quick Tips

Answers to your questions

by Lon Poole

The August *Quick Tips* included a tip about reducing the font size of a blank space to bring adjoining words closer together. Audrey Ramm of New York City suggests changing the font itself to make the blank space smaller. For example, if you use Geneva 12 and New York 10, changing spaces to Geneva 9 and New York 9 makes them smaller. Substituting Helvetica 9 and Times 9 makes the spaces smaller still. Conversely, using a font that takes up more room, such as Athens or London, will expand word spacing.

Q Switching Start-up Disks

When I eject a start-up disk, insert another start-up disk, and try to open an application on the second disk, the Mac asks me to swap disks. Why? Shouldn't it switch to any disk that contains the Finder?

Todd Andros
Coral Gables, Florida

A The Mac does switch start-up disks under the circumstances you describe. But it may ask you to insert the old start-up disk so that it can update that disk's invisible desktop file. (The desktop file keeps track of Get Info comments and icon and window arrangement.)

The Mac does not automatically switch start-up disks if the current start-up disk is a hard disk. However, you can force it to switch by pressing the Option key while you open an application on another start-up disk. You can also force a switch to another start-up disk by pressing the Option and ⌘ keys while opening the Finder icon. The Mac won't switch start-up disks at all if you're using MultiFinder.

Remember that a start-up disk must contain both the Finder and System files. On an 800K disk or any other disk that uses the Hierarchical File System (HFS), they must be in the same folder–usually the System Folder.

Q Em Dash

I need to use a long dash in my writing–as in setting off this phrase–but I don't want to use two hyphens as I normally do.

Paul Stobnicke
Syracuse, New York

A An em dash (—) is the usual replacement for double hyphens. You type it by pressing Shift-Option-hyphen. An en dash (–) is shorter than an em dash but longer than a hyphen. Type an en dash by pressing Option-hyphen.

You may also wish to use opening and closing quotation marks (for example, Hoagy Carmichael's "Stardust") instead of the usual simple tick marks (Four Tops' "Bernadette"). Type Option-[for ', Shift-Option-[for ", and Shift-Option-] for ". Use the Key Caps desk accessory to investigate other punctuation and characters you can use to bring your documents closer to typeset quality.

Q Temporarily Enlarged Text

A friend of mine has very poor eyesight and wishes to write and edit his 500-page book using an 18-point font. But he wants to reduce the entire document to 12-point size for printing. How is this possible without having to slowly highlight all that text?

Jeremy M. Brown
Brampton, Ontario, Canada

A There's a quick and easy method for selecting an entire document that works with almost every Macintosh word processor. First, click at the beginning of the document. Then scroll to the end of the document (by dragging the white box to the bottom of the vertical scroll bar). Finally, press Shift while you click at the end of the document. Some word processors have even simpler methods. In *Word,* for example, you move the pointer to the left edge of the document window (where it changes to point right instead of left), press ⌘ and click.

However, you may not always want to change an entire document to one font size. Headings may be larger than body text, for example. If your word processor has style sheets, you can use them to control the font sizes of different types of paragraphs independently. *Word* 3.0's Define Styles command gives you this ability.

A completely different approach is to use the application *InLarge* ($95 from Berkeley System Design, 1708 Shattuck Ave., Berkeley, CA 94709, 415/540-5536). It provides you with a "magnifying glass" whose size and strength you specify. The "glass" can magnify from 2 to 16 times and can be as small as 64 by 64 pixels (about ⅞-inch square) or as large as a whole screen. *InLarge* is specifically designed to assist visually impaired Macintosh users.

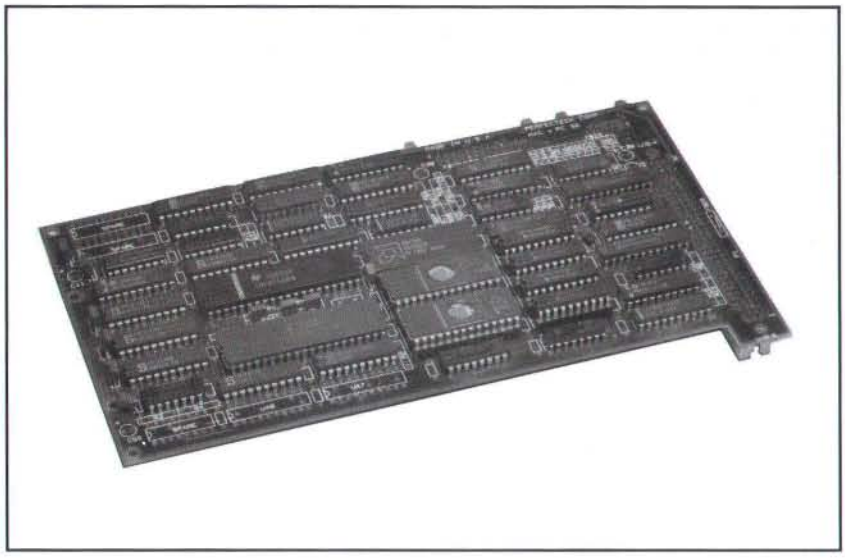
InLarge can also invert the display so that it's predominantly white on black.

Q MacDraw Out of Order

MacDraw works just fine on the Macintosh SE at my office but refuses to open a new document properly on my SE at home. I can open and edit an existing document, but a new "Untitled" drawing window shows up tinted gray, and none of the drawing tools work. I discovered that the program works fine if I start up with either the *MacDraw* disk or the System Tools disk, so I assume there must be something

(continues)

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Circle 670 on reader service card

wrong with the System file on my hard disk at home. I tried copying the System file from the System Tools disk to my hard disk, but I still have the same problem with *MacDraw*. What's wrong with my hard disk?

Charles T. Bohanan
Decatur, Georgia

A The System Folder on the start-up disk must contain a printer resource, or *MacDraw* (versions 1.7 and 1.9) will exhibit the symptoms you describe. Drag the ImageWriter or LaserWriter icon from the System Folder on the System Tools disk to the System Folder on your hard disk.

Q **Hard Disk Partitions**
Is there a utility available that allows SCSI hard disks to be partitioned into two or more parts so that they may be used as separate drives? I have a Mac SE with internal and external hard disks.

Jack Zhe
Freeville, New York

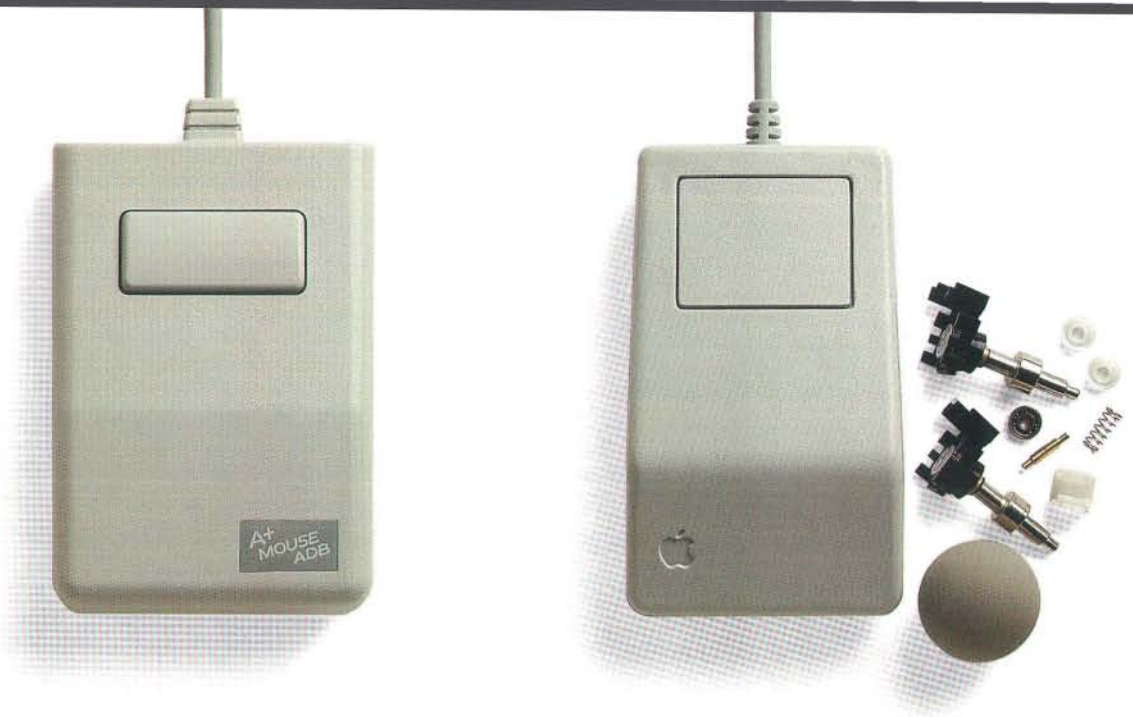
A I've used *Hard Disk Partition* version 1.05 with good results ($54.95 from FWB Software, 2040 Polk St. #215, San Francisco, CA 94109, 415/474-8055). It's a desk accessory you use to create partitions and to manually mount and unmount them. (Mounting a partition is analogous to inserting a disk; unmounting is analogous to ejecting a disk and dragging its icon to the trash.) Partitions can also be mounted automatically during start-up. Once mounted, a partition behaves like a regular disk.

However, *Hard Disk Partition* can only be used with the start-up disk (probably your internal hard disk). FWB Software is working on a new version that will work with more than one drive; FWB hopes to have it available early in 1988.

Two Word Word Counts

Tip: I used the tip in the September 1987 *Macworld* ("Insights on Microsoft Word 3.0") for counting words in a *Word* 3.0 document and discovered a quicker and simpler variation. With the flashing insertion point at the beginning of the document, choose Change from the Search menu. In the Change dialog, enter ^w in the Find What box, enter ^n in the Change To box, and click Change All. At the end of the operation, look at the lower-left corner of the document window to find the num-

(continues)



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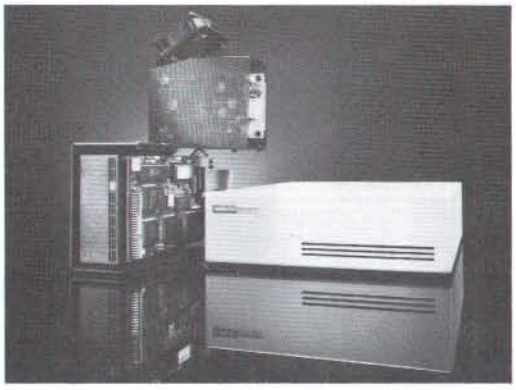


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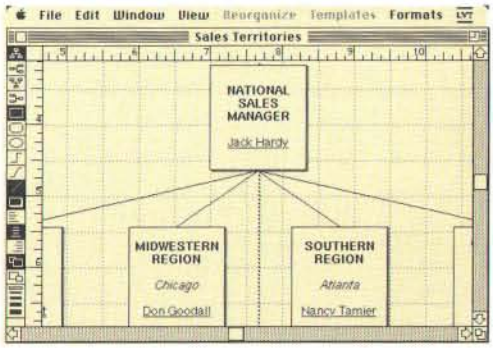
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Dividing Line

In More, *double vertical lines (type Shift-backslash on the Plus or SE) divide headline text into multiple lines on a tree chart.*

ber of changes made. This number, plus or minus one, is the number of words in the document. Choose Undo from the Edit menu to restore your document to its previous state.

Ricky Adebanjo
Stanford, California

I'd suggest saving your document before beginning so you have something to revert to in case anything goes wrong. You might inadvertently do something that would make Undo impossible.

Tip: To count words quickly in a *Word* 3.0 document, simply divide the character count by 6.355. I derived this number of characters per word by dividing spell-checker word counts into character counts on the same documents and averaging the results. The deviation from this mean is low.

Mark Dowie
Point Reyes Station, California

The number of characters appears in the lower left-hand corner of the screen immediately after you open or save a Word *3.0 document.*

Split-Line Tree Charts

Tip: Here's a tip for anyone who uses *More* and does a lot of tree charts. When you create headlines, use the vertical line (Shift-backslash on the SE and Plus) to separate information that you want to have appear on individual lines when you change to tree charts [see "Dividing Line"].

Tim Smith
Jacksonville, Florida

Automatic Window Closer

Tip: If you hold down the Option key from the time you quit an application until you see the Finder menu bar, all previously opened windows will be closed. The desktop will appear much more quickly.

Ali Kaylan
Rochester, New York

You can also make the Finder forget that it ever opened a window by pressing Option while you open a disk or folder icon. However, neither of these Option-key tricks works with MultiFinder.

Overstrike Characters

Tip: It's easy to create special symbols and characters by combining standard

(continues)

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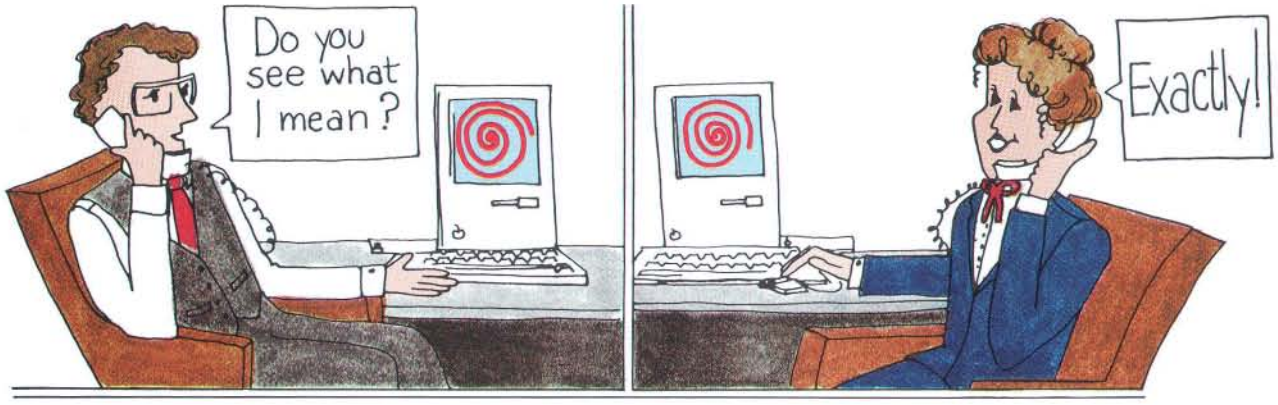
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Symbol	Formula	Characters Combined
$\bar{X}$	.\o(X,.\s.\up11(_))	"X" and superscripted "_"
$\dot{P}_t$	.\o(P,.\s.\up12(.)).\s.\do5(t)	"P", superscripted ".", and subscripted "t"
$\underset{\sim}{Y}$	\o(Y,.\s.\do11(~))	"Y" and subscripted "~"

Combining Characters

Transform standard characters into special characters using Word *3.01's math-formula commands to combine the Overstrike and Superscript/Subscript commands.*

characters using *Word* 3.01's commands for typesetting math formulas. This avoids the hassle of creating special fonts or having to use *MacDraw* or *MacPaint* to draw special characters and then paste them into the *Word* document. To create special characters, combine the Overstrike command and the Superscript/Subscript command. For some examples of symbols often used in statistics and economics, see "Combining Characters."

Stuart M. Glosser
Whitewater, Wisconsin

While typing formulas, be sure the Show ¶ option is active (choose Show ¶ from the Edit menu). When you finish typing the formula, choose Hide ¶ from the Edit menu to see the results.

Be sure to prefix every formula command and ⌘ option with the formula character, which you type by pressing Option-⌘-backslash. Word *displays this character as a backslash preceded by a dot (.\).*

The Overstrike command superimposes two or more characters. Options let you align the superimposed characters at their centers, left edges, or right edges. The Displace command is similar to the Overstrike command. Displace lets you space forward or backward any number of points between two characters to make them overlap.

The Superscript/Subscript command moves a character up or down the number of points you specify. Keep in mind that if you change fonts, styles, or font sizes, you may have to adjust the number of superscript or subscript points.

The Word *manual and online help have more information on formula commands. Look under "Formulas."*

E-Z Row, Column Insertion

Tip: I found this shortcut the other day in *Excel* 1.04. When working on a worksheet or macro, press the Option key and click or drag a row, column label, or cell to quickly insert single or multiple rows, columns, or cells.

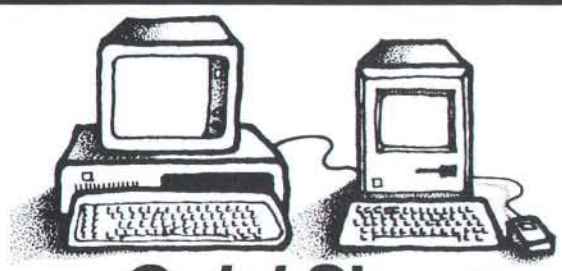
Barry J. Lutz
Chicago, Illinois

Quick Eject in Font/DA Mover

Tip: To eject a disk while using Font/DA Mover, hold down the Option key and click the Close button. This saves the time and trouble of clicking Close, then Open, and finally Eject.

James Staudte
Burke, Virginia

(continues)



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from Mitsubishi Electronics is a 35V" auto-tracking color monitor fully compatible with the Apple® Macintosh™ II. Applications for presentations, training, CAD/CAM and more. Make the move to Mitsubishi® today for all your Macintosh II needs.

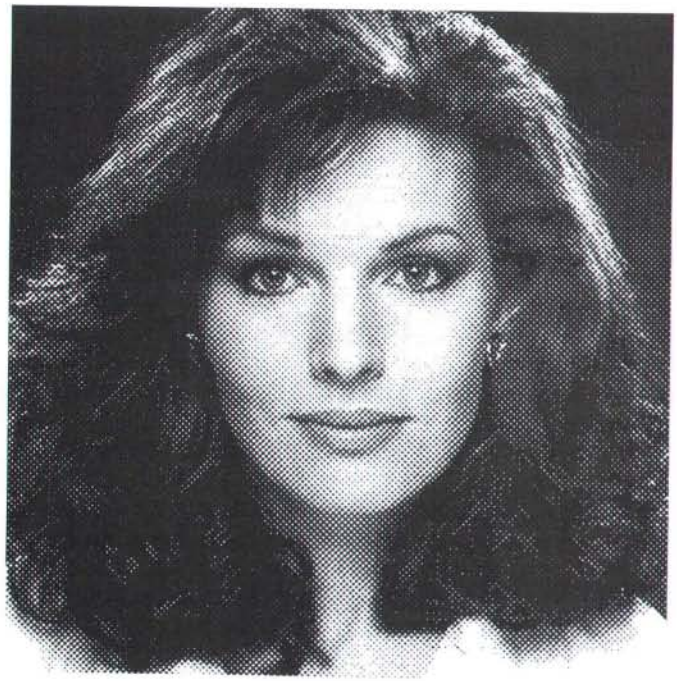
Mitsubishi Electronics America, Inc., Computer Peripherals Division, 991 Knox Street, Torrance, CA 90502. Telephone: (213) 515-3993, ext. 382.

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WHICH SCANNED IMAGE COST NEARLY TEN TIMES MORE TO PRODUCE?

It's tough, isn't it. They both look great. But the image on the left was digitized by a scanner that costs over $2,000. The image on the right by ThunderScan.® The scanner that replaces ImageWriter's* ribbon cartridge. Just $249 complete.

Now, we'll admit, the more expensive scanners are faster than ThunderScan. But what we lack in speed, we make up for in software power. And that can actually save you time in the long run. Because with ThunderScan there's no rescanning an image to get it right.



ThunderScan saves true gray shades. So once an image is scanned, you can change it any way you want. As many times as you want. Control contrast and brightness. Create special effects. Take your image at face value or enhance it to your art's desire.



Use LaserWriter to create line screens and frames.

ThunderScan also gives you true halftones. So you can tap the full resolution of your printer. (We tapped the Linotronic® 300 for the above images, but you can use your ImageWriter™ or LaserWriter™).

Now you can plug high-resolution halftones into your PageMaker,® Quark XPress™ or ReadySetGo!™ documents. Or use your scanned images with painting and drawing software like Illustrator™ and LaserPaint.™

ThunderScan's special effects include straight line screens, rotations and frames. Plus, you get a lasso for working with irregular shaped areas. And with our new Power Port,™ ThunderScan is Macintosh™ Plus and SE compatible, right out of the box. No wonder ThunderScan was recently voted "Best Digitizer/Scanner" in *Macworld's* first annual World Class Awards.

MACWORLD WORLD CLASS AWARD 1987

So if you want a sophisticated, high-resolution scanner and like the idea of saving money, the choice is as plain as the nose on your...well, you get the picture. Now get yourself a ThunderScan.

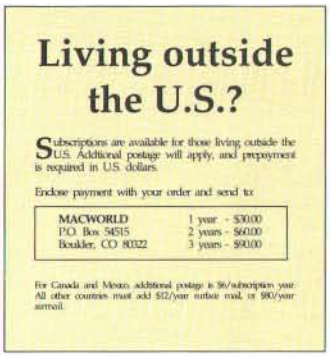
Thunderware

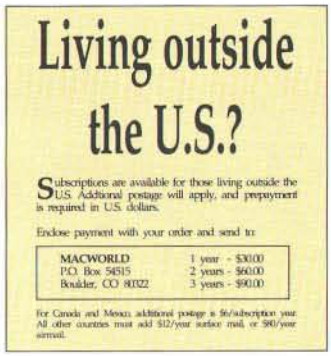
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Circle 176 on reader service card







The Objective Type

Tip: Creating an attractive ad headline involves custom-fitting it to the allotted space by precisely adjusting its height and width. You can set headline copy with *MacDraw* and then import it into *PageMaker* by cutting and pasting or by using *PageMaker*'s Place command. Once it's in *PageMaker*, you can stretch and pull this "graphic object" into the headline space as if it were rubber type. This strategy is OK for simple headlines, but *MacDraw*'s kerning is inadequate and its line-space control is too primitive for multiline copy. A recent upgrade of *Glue* called *SuperGlue* gives you much more effective results without forcing you to quit *PageMaker*. Set the type in *PageMaker* with automatic kerning and custom leading so that it looks better than *MacDraw* type. Then "print" using *SuperGlue* to transform the *PageMaker* text into a graphic object. Copy and paste the object back into *PageMaker* with *SuperGlue*'s SuperViewer desk accessory. You can then enlarge, shrink, widen, or narrow the entire object.

This technique works as well on a whole ad as it does on individual headlines [see "Rubber Text"].

David Zahn
Stowe, Vermont

Rubber Text

From within PageMaker, SuperGlue *lets you transform* PageMaker *headlines and text into graphics objects you can stretch or shrink to fit any space. Here an ad is shown in its original form (top left), with its headline elongated and body type the same size as original (top right), and with its entire contents stretched horizontally (bottom).*

We pay from $25 to $100 for tips published here. Send tips or questions to Quick Tips, Macworld, *501 Second St., San Francisco, CA 94107. Send electronic mail to CompuServe (70370,702), The Source (BCW440), or MCI Mail (addressed to* Macworld*). All published submissions become the property of* Macworld. □

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EZTax-PREP costs $129.95 ($99.95 for Macintosh). Add $3.00 shipping and handling, and 6% sales tax in PA. ***Please specify computer and spreadsheet you use.***

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NOW THERE'S 3+ FOR MACINTOSH...AND ONE HALF OF CORPORATE AMERICA CAN TALK TO THE OTHER HALF.

A recent study* indicates the rapidly growing acceptance of the Macintosh by the business world.

Yet this is of little value to Corporate America if Macintosh users cannot communicate with and share the resources of existing IBM PCs, Personal System/2s and IBM PC compatibles.

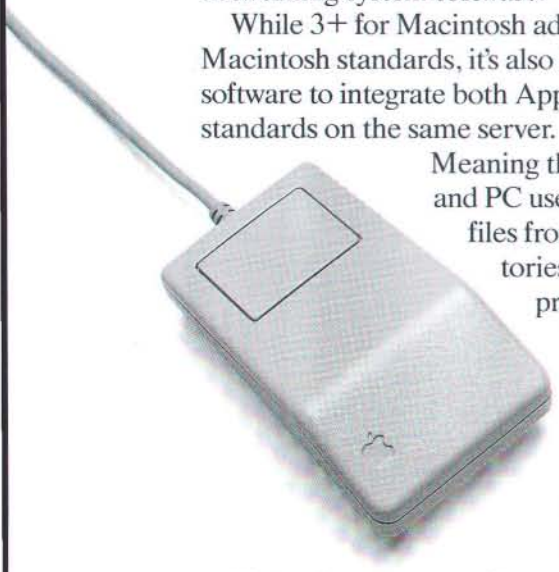
That's why—because of 3Com's continuing commitment to total networking encompassing all standards, architectures and platforms—we've developed 3+ for Macintosh.

3+ for Macintosh is part of the 3Com 3+ family of network system software, Corporate America's most comprehensive, productive and popular networking system software.

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*PC Tech Journal (August 1987) showed that 49.7% of readers who responded to a questionnaire felt that Macintoshes would be of importance to their companies in the future.

PC MAGAZINE EDITORS CHOICE

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Getting Started with the New Mac System

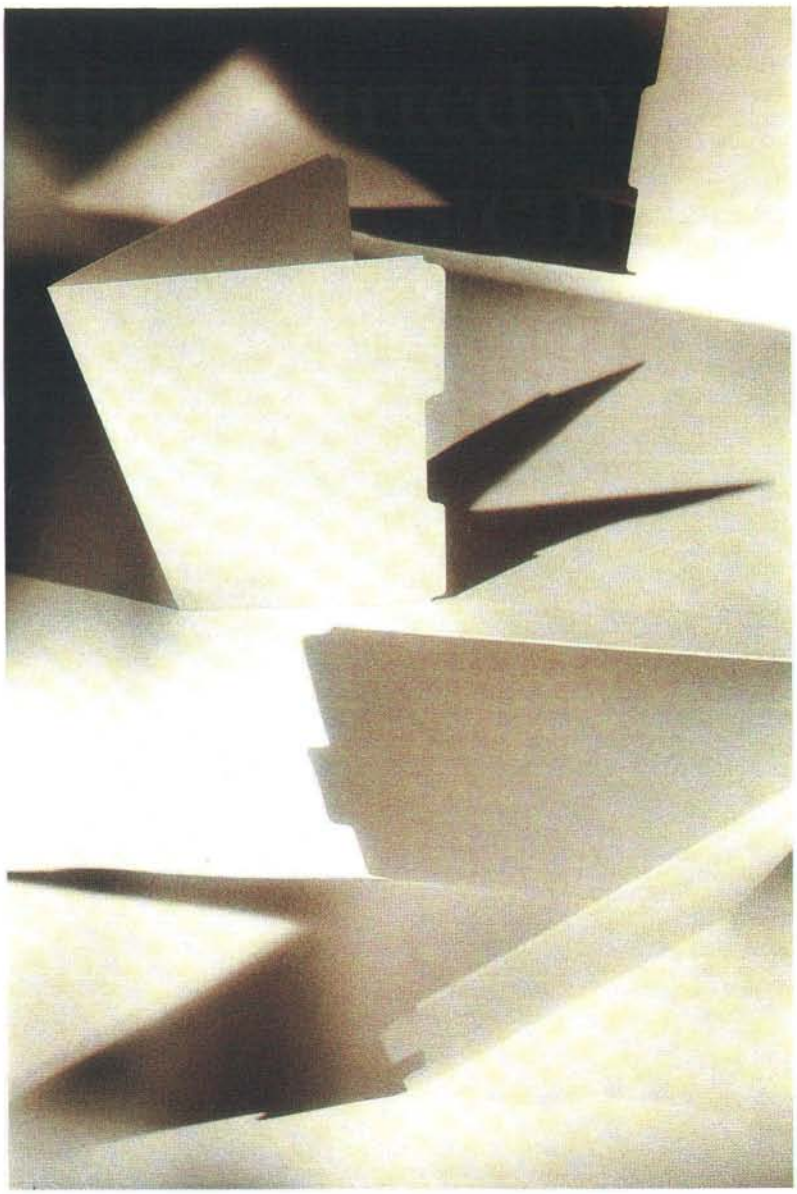
Keeping up with the changing System Folder and matching the system to the Mac

by Jim Heid

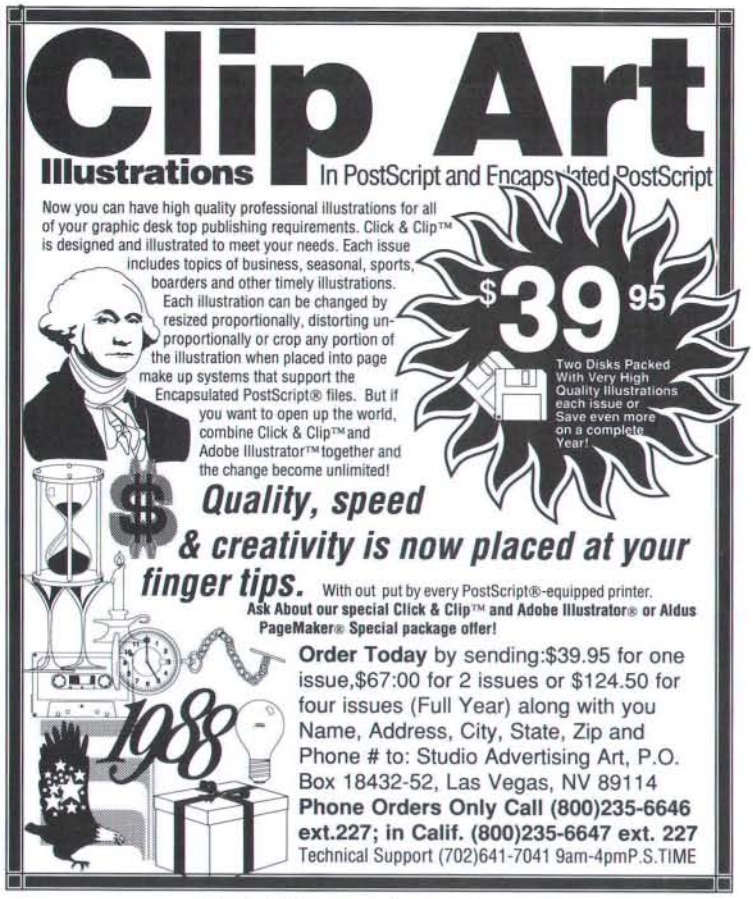
My system should age as well as the Mac's. For me, the past year brought a stronger eyeglass prescription and occasional backaches–the rewards for writing by day and being a couch potato by night. For the Mac, 1987 brought new machines, faster performance, expandability, MultiFinder, and more. For the Mac at least, it was a very good year.

In *Getting Started*'s premier installment, we toured the Mac's System Folder and learned each player's purpose (see "Getting Started with the Mac System," *Macworld,* November 1986). But much has changed since the halcyon days of System 3.2 and Finder 5.3. Apple delivered two new Macs last April and has released three major system updates: System 4.0/Finder 5.4 in March, System 4.1/Finder 5.5 in May, and System Tools 5.0 in October. With its latest system release, Apple has assigned one version number to the whole package of system files. However, each file within System Tools 5.0 has retained its own version number as before (including the Finder, now 6.0). The new system files give Macs new capabilities, and the old standbys have evolved to keep up. This month, we ring in the New Year by revisiting our old acquaintance and its new contents. "System Folder Revisited" shows the icon, purpose, and latest version number of each player, as well as which version of the system Apple recommends for which Mac.

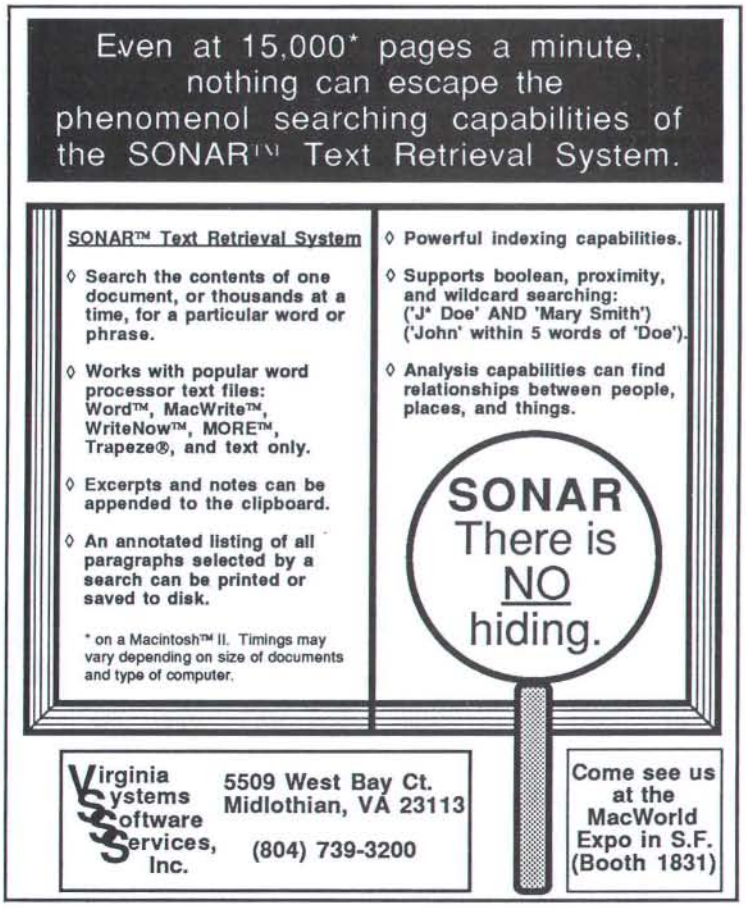
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JEFFERY NEWBURY



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An Expanding World

The System Folder owes its progress to three catalysts: last April's unveiling of the Macintosh SE and Mac II, the March christening of the *AppleShare* networking software, and the October release of MultiFinder. The new Macs marked the shift toward hardware expandability but in the process introduced compatibility challenges. *AppleShare*'s ability to share a hard disk over a network required changes in the Finder. MultiFinder's approach to running multiple programs required changes in many files and brought with it an appetite for memory that has many people fuming on their way to buy upgrades.

But few would complain about the debut of expandable Macs. The SE's single system expansion slot and the Mac II's six Nubus slots let those machines house boards for color displays, IBM PC compatibility, increased speed, networking, and more. However, the birth of expandable Macs presented Apple with a challenge: maintaining software compatibility for all models, regardless of what expansion options they may hold. In the IBM PC world, users must often run software *installation* programs to tell other programs what kind of hardware they're using. To avoid imposing that chore on Macintosh users, Apple took the system files in a new direction: toward modularity.

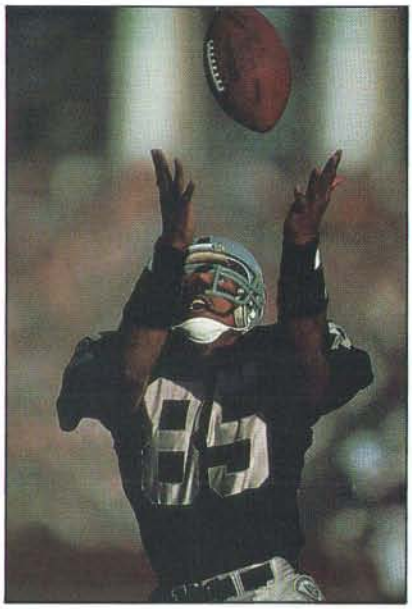
The best place to see the modular approach is the Control Panel (accessed through the Apple menu) in System versions 4.0 and higher (see "The Old and the New"). Along its left side the Control Panel now boasts a row of icons, each corresponding to an *extension* that lets you set options for a particular device. The extension called General is used for the same basic settings the old Control Panel handled–the time, date, speaker volume, and so on. The Mouse and Keyboard extensions govern the mouse pointer's speed and the keyboard repeat rate. Mac SE and II users with more than one SCSI hard disk can use the Startup Device extension to tell the Mac which one to use when starting up. And Mac II owners can use the Color, Monitors, and Sound extensions to choose colors and adjust monitor settings, to specify the interaction between multiple monitors attached to one machine (for example, which windows should appear on

(continues)

System Folder Revisited

File Name	Purpose	Current Version
System Files		
Finder	Disk, program management	6.0, 4.2 for 128K Macs, 5.3 for 512K Macs
MultiFinder	Runs multiple programs simultaneously	1.0
System	Holds fonts, desk accessories, operating system	4.2, 2.0 for 128K Macs, 3.2 for 512K Macs
Scrapbook File	Holds contents of Scrapbook	2.3
Note Pad File	Holds contents of Note Pad	n/a
Clipboard File	Provides auxiliary storage for Clipboard data	4.2
MiniFinder	Switches quickly between programs (w/o MultiFinder)	1.0*
Backgrounder	Lets printing take place in the background	1.0
Macintalk	Lets applications generate speech	n/a
DA Handler	Runs desk accessories under MultiFinder	1.0
Printer Resources		
ImageWriter	Allows printing to ImageWriters	2.6
LaserPrep	Prepares PostScript printers for printing	5.0
LaserWriter	Allows printing to PostScript printers	5.0
AppleTalk ImageWriter	Prints to AppleTalk-equipped ImageWriter II	2.6
PrintMonitor	Print spooler for PostScript printers	1.0
Control Panel		
Startup Device	Selects start-up disk (SE or II)	3.2
Monitors	Selects display options on Mac II	3.2
Mouse	Adjusts mouse tracking and double-click speed	3.2
Keyboard	Adjusts key repeat rate and delay	3.2
General	Provides basic Control Panel settings	3.2
Sound	Selects system beepsounds (Mac II)	3.2
Color	Displays selected test or icon in color	3.2
Other Files		
Key Layout	Provides keyboard layout for Key Caps	2.2
Easy Access	Lets multikey combinations be entered key by key, and allows pointer movement with numeric keypad	1.0
Finder Startup	Automatically starts up selected programs	n/a
Startupscreen	Replaces "Welcome to Macintosh" start-up message	n/a

*available in System 4.1 and earlier versions



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Kick off your home season with this software classic now at your local computer store. Or call **1-800-NFL-CHAL** TOLL FREE. Be sure to check out **PRO Challenge,™ Basketball Challenge,™ Oligopoly,™** and **Bermuda Square,™** examples of some other First Class Software from XOR.

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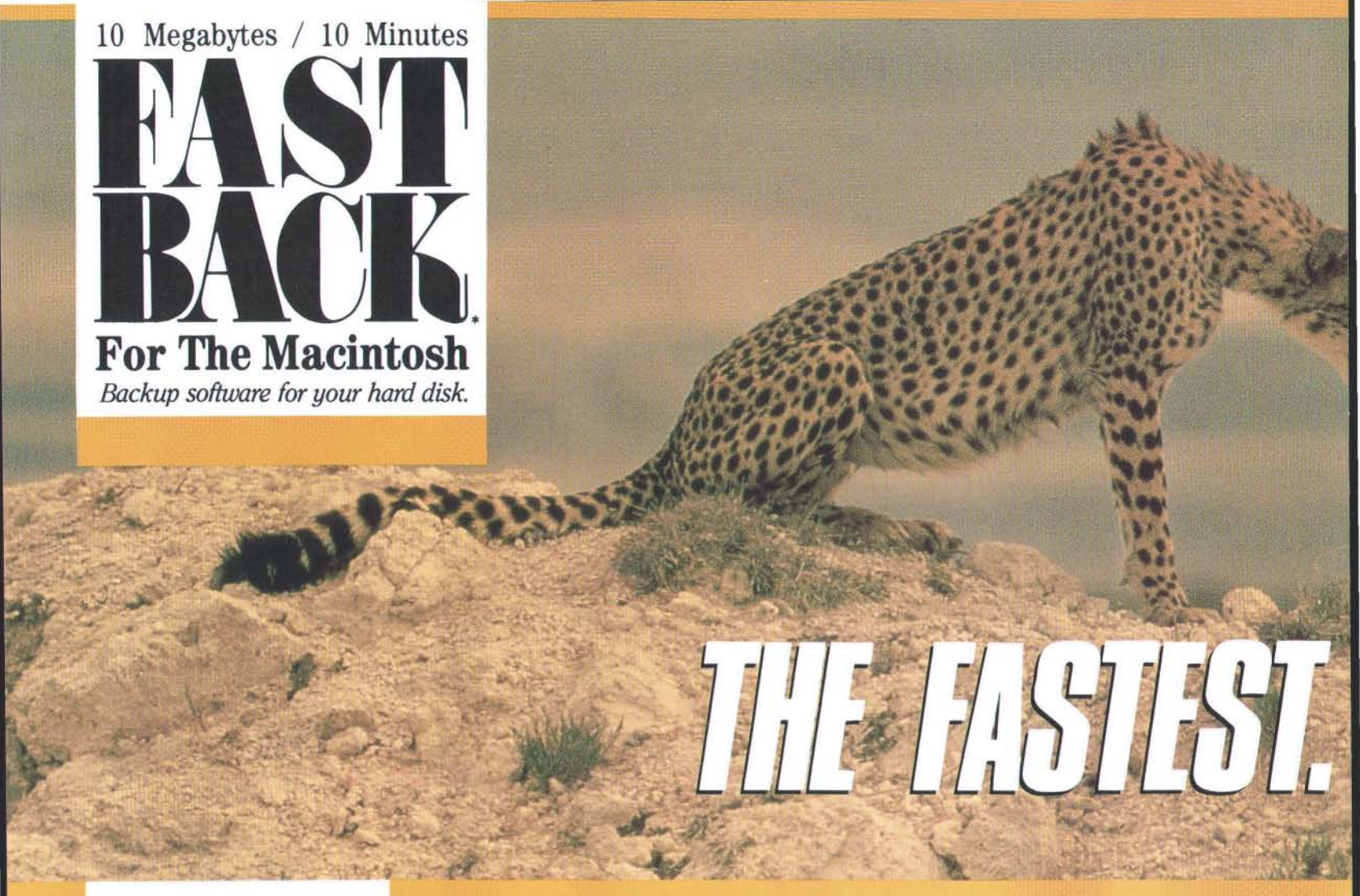
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For The Macintosh

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NOW AVAILABLE FOR THE MACINTOSH

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Fifth Generation
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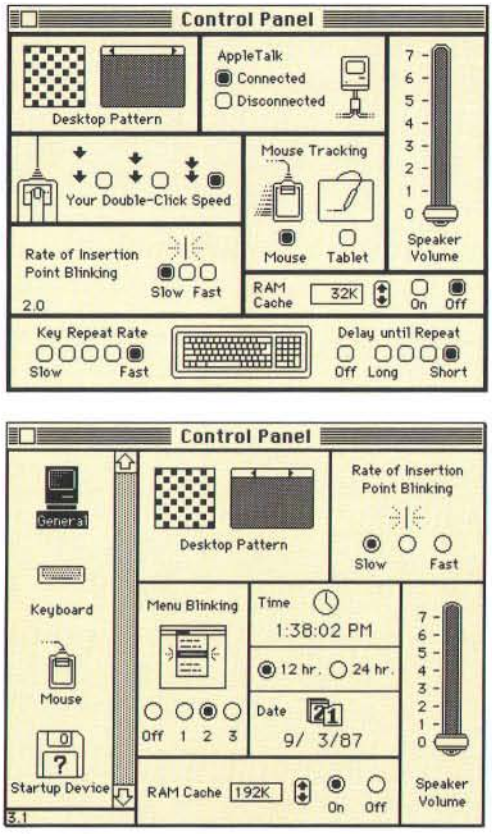
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The Old and the New

In System versions 4.0 and later (bottom), the Control Panel uses cdev resources; each cdev controls a different aspect of the Mac's operation. When you open the Control Panel, it displays along its left edge any cdevs it finds in the System Folder. (Tip: to see who programmed the Control Panel, click on the version number below the icon list.) At top, the nonmodular Control Panel of System 3.2. The controls for AppleTalk have moved to the Chooser, while those for the keyboard and mouse are now in their own cdevs.

which screens), and to choose a digitized sound to replace the standard system beep.

Each extension is actually a separate System file called a *cdev* (pronounced *see-dev*), short for *Control Panel device*. When you open the Control Panel, it looks for cdevs, then displays the icon for each one it finds. Click on an icon, and the cdev swings into action, adding to the Control Panel's window whatever buttons and options are necessary for the device you chose. Thanks to cdevs, Mac II and SE users don't have to run cantankerous installation programs to add new hardware to their machines. Instead, users simply copy into the System Folder any cdevs that accompany the new add-ons and use the Control Panel to set up the new hardware.

Cdevs have other uses, too. A Mac II software package called *Colorizer* (Palomar Software, 619/727-3922) includes a cdev for adding color to menus, windows, and other on-screen objects. *QuicKeys* (CE Software, 515/224-1995) is a slick cdev that lets you add keyboard shortcuts to menu commands and type out lengthy text passages or even run applications with a single keystroke. Some free cdevs are available in the public domain through user groups and online services. One called *Cache II,* by Jan Eugenides, lets Mac II users improve compatibility by disabling the 68020's instruction cache, which can cause some pre-Mac II programs to crash. And for fun, try Mark Bennett's *Cheap-Beep,* which lets Mac Plus and SE users replace the standard system beep with digitized sounds, including *Star Trek*'s Dr. McCoy barking, "Are you out of your Vulcan mind?"

Apple is also encouraging application developers to use cdevs to add "preferences" features to their programs. With this approach, instead of choosing a Preferences command to specify your favorite working options, you would open the Control Panel and click the application's cdev. At this writing, no developers are using cdevs in this way, but several I've spoken with say they plan to.

DAs and Menus within Menus

Another example of the modular approach is the improved Key Caps desk accessory. Key Caps now requires a new system file called Key Layout, which contains the resource information Key Caps needs to replicate the keyboard layout for the Mac's four possible keyboards—the original, the Mac Plus keyboard, and the 81-key or 105-key Apple Desktop Bus keyboards for the SE and II. Key Caps also has a menu that lets you change the font in which the keyboard layout appears, a useful feature for locating characters in pictorial or symbol fonts.

Speaking of desk accessories (commonly known as DAs), today's system files also boast an improved Chooser, the DA you use to select printers and network file servers. Previous Choosers could display icons for only six devices, which might not be enough for a large AppleTalk network with many printers and file servers. Since the new Chooser lets you scroll through

(continues)



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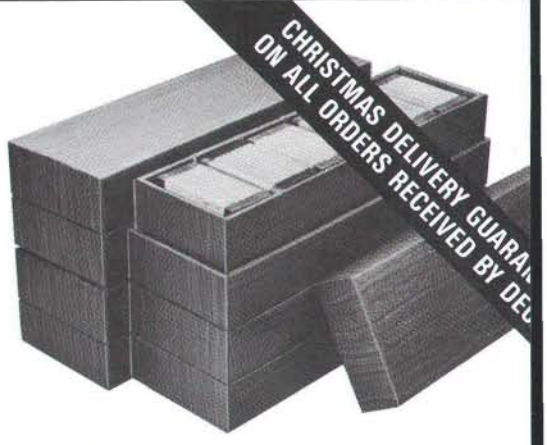
Pick up your copy of **Basketball Challenge** at your local computer store today. Or call **1-800-635-2425** TOLL FREE. And be sure to check out **NFL Challenge,® PRO Challenge,™ Oligopoly,™** and **Bermuda Square,™** examples of some other First Class Software from XOR.

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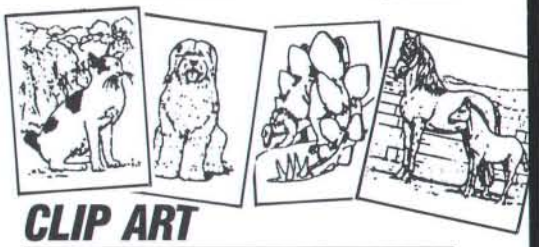
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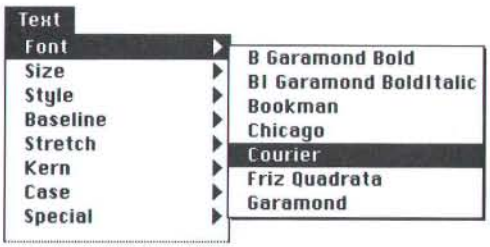
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the entire icon list, you can now access as many devices as your network has.

A significant enhancement that debuted in System 4.1 is the ability to create *hierarchical menus*—menus within menus that appear when you drag down to the hierarchical menu's title and pause (see "A Menu's Menu"). Hierarchical menus give programmers more places to cram options without having to create gargantuan dialog boxes. A hierarchical menu can even contain its own hierarchical menus—like small boxes hidden within a larger one.



A Menu's Menu

System versions 4.1 and higher contain revised Menu Managers that can create hierarchical menus—menus within menus that appear when you drag to a hierarchical menu title and pause briefly. Shown here are the Text and Font menus from Target Software's Scoop *desktop publishing program, one of the first applications to use the new menus.*

Finding Common Ground

Besides new system files, each new generation of Mac has brought revised read-only memory (ROM) chips, whose software resides permanently in the Mac and creates menus, windows, and most other aspects of the Mac's personality. The 128K and 512K Macs contained 64K of ROM. The Mac Plus and the 512K Enhanced doubled that amount to 128K, and the SE and the II doubled it again, to 256K. Besides containing twice the software as the previous generation, each revision brings faster performance and more features. For example, the Hierarchical File System (HFS), which provides folders for efficient hard-disk management, debuted in the 128K ROM of the Mac Plus and 512K Enhanced. The Mac II ROM contains software for producing color displays and managing expansion slots. Both the SE and II ROMs house improved text-editing routines; they also hold fonts that used to reside in the System file on earlier Macs.

But the problem with hot-rodding ROMs is that older machines might get left out in the cold, unable to run programs that require routines in the new ROMs. Apple's solution was to establish some common ground—a set of features and capabilities that developers could assume would be present in each generation of the system.

An Apple utility called Installer (included with the new system disks) creates this common ground. When you start Installer, you'll see a list of *scripts*—each tailored to a specific Macintosh model. Just choose the script you need, aim the Installer at a system disk, and you've brought that System Folder up to date. During the updating process, Installer *patches* the disk's System file, a job that involves adding the system routines necessary to create the common ground. When you start up an older Mac with a system disk that was updated for it, those routines (which are in ROM on the new machines) are loaded into an area of the Mac's memory called the *system heap.* That reduces the amount of free memory available, but enough remains to run most programs. The benefit is that, despite four years of evolution, the Macintosh family remains remarkably compatible.

But not completely compatible. The 128K ROMs do so much more than their 64K ancestors that patching all the needed routines into memory would leave little room for running programs. For that reason (and because of the Mac Plus's popularity), many software developers are abandoning 64K ROMs and crafting their wares for machines having 128K or larger ROMs—in other words, for the Mac Plus and its descendants. If you have a 128K or an unenhanced 512K Mac, it's time to consider upgrading if you want to run the latest programs.

Lost in Finders

Indeed, you'll *have* to upgrade to at least a 512K Enhanced to run the latest system software, System Tools 5.0, and

(continues)



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you'll need the full Mac Plus upgrade to run MultiFinder. MultiFinder represents the Mac's first, wobbly steps toward *multitasking*–which enables you to run multiple programs simultaneously or work in applications while the computer performs time-consuming tasks, like printing or telecommunications, in the background (see "MultiFinder: The Application Juggler," *Macworld,* October 1987.) But because of the extra system software required to keep multiple programs from bickering over each other's bytes, MultiFinder craves memory like I do DoveBars. If you're upgrading to a Plus and you want to use MultiFinder to work with multiple applications, you'll need at least a second megabyte of RAM (random access memory–the temporary workspace in which applications run)

I usually perform only one task at a time, and I enjoy taking a break while my Mac and printer converse, so MultiFinder is of little use to me. But its cohort, Finder 6.0, does have a place in my System Folder. Finder 6.0 is the third Finder to appear this year. The first, Finder 5.4, was released along with Apple's *AppleShare* file-server software, which lets members of an AppleTalk network share hard disks attached to a Mac Plus or another 1MB Mac (see "AppleShare: Multifaceted Networking," *Macworld,* March 1987, and "Getting Started with Networking," *Macworld,* September 1987).

When *AppleShare* is running, Finder 5.4 and its descendants recognize it and add a Get Privileges command to their File menus, which lets network members specify how their own files and folders can be accessed by others. The new Finder's disk windows also reflect the network's design, with icons showing who can open and modify folders. By making the Finder "*AppleShare* aware," Apple created a networking product that blends into the Mac environment better than any other.

The Finder's other improvements range from cosmetic to convenient. The Trash Can bulges when it contains something. Two Get Info windows can appear side by side, which is handy when you're comparing two files to see which is the most current. A Restart command debuted in the Special menu, and the workings of the Shut Down command changed. Shut Down now uses a new system routine called the Shutdown Manager. On a Mac II, the Shutdown Manager turns off the computer. On other Macs, it displays a dialog box that gives you the option of shutting off the Mac or restarting it. The Clean Up command has some new permutations that let you selectively clean up icons. And a slick shortcut appeared: press the Option key while dragging a file into a different folder and the Finder puts a copy of that file in the folder, rather than moving the original.

Finder 6.0 shares these refinements and adds its own. The dialog box that appears when you copy files contains a Cancel button and conveys more information, showing which file is currently being read or written, while a little bar graph shows the Finder's progress as it copies multiple files. The About the Finder command shows how much memory is available; when MultiFinder is running, you'll also see how much memory is consumed by each open application. On Mac IIs, a Color menu lets you choose a color for an icon or a folder. The Set Startup command now lets you specify whether to use MultiFinder, and if so, whether it should open any applications upon start-up.

More Power to the Printer

The printer drivers have been remodeled too. The 4.0 versions of the PostScript printer drivers, LaserWriter and LaserPrep, were roughly twice as fast as their version 3.0 counterparts, and they offered several new options. You can specify that a page be flipped vertically or horizontally, or inverted (black becomes white, and vice versa). These options work especially well with Linotronic PostScript typesetters. By loading the typesetter with film instead of the more commonly used opaque photographic paper, you can create the film negatives and "wrong-reading" images (which appear backwards when viewed from the light-sensitive side of the film) that many printers require.

Another LaserWriter print option, Larger Print Area, lets you print closer to the edges of a page by stealing printer memory usually reserved for holding downloadable fonts. Finally, there's an op-

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tion that eliminates the slight distortion that often plagues printed bit-mapped (*MacPaint*-type) graphics because their 72-dot-per-inch (dpi) resolution isn't an even multiple of the LaserWriter's 300 dpi. To resolve this problem, the Precision Bitmap Alignment option reduces the entire page by 4 percent. The latest PostScript drivers, versions 5.0, provide these same niceties and work with MultiFinder as well, so you can issue a Print command and then jump into another job while the drivers get the printer going in the background.

The past year also saw new versions of the ImageWriter drivers that offer improved print quality in the Best mode and also fix miscellaneous bugs. And a new print driver, ImageWriter LQ, is shipping with the ImageWriter LQ printer.

Odds and Ends

Other enhancements to the System Folder may not be as significant as MultiFinder, but they're noteworthy nonetheless. Easy Access is an Init file that provides two keyboard-modification features. (Init files contain small system-modifying routines that the Mac executes upon start-up. For a more detailed explanation of Inits, see "Getting Started with Desk Accessories," *Macworld,* October 1987.) One called Sticky Keys, which makes the keyboard more accessible for the handicapped, goes to work when you press the Shift key five times. When Sticky Keys is active, you can use combination keystrokes (such as ⌘-S, or Shift-Option-[) without having to press two or more keys simultaneously. Instead, you press one after another: first the modifier key or keys (⌘, Option, Shift, Control), then the character key. Easy Access's other feature, obtained by pressing ⌘-Shift-Clear, is called Mouse Keys. It lets you move the pointer using the keyboard's numeric keypad (see "The Pointer's Keys"). It not only makes single-pixel positioning a cinch, it could be a godsend if your mouse dies while you're on deadline.

It should be obvious that updating your System Folder is the least expensive way to improve your Mac. The latest system software is available free from user groups, online services, and Apple dealers. (If you

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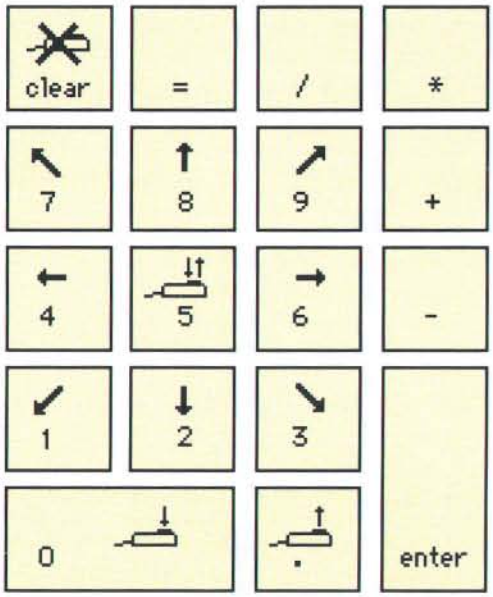
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The Pointer's Keys

The Mouse Keys feature of the Init file Easy Access lets you move the mouse pointer using the keyboard's numeric keypad. To activate Mouse Keys, press ⌘-Shift-Clear. Subsequently, the numeric keys move the pointer as shown here. The longer you hold down a key, the faster the pointer moves; tapping a key moves the pointer one pixel at a time. Pressing the 5 key is equivalent to clicking the mouse button; pressing 0 is like holding down the mouse button, while pressing the period key is like releasing it. To deactivate Mouse Keys, press the keypad's Clear key.

want documentation, you can buy Apple's offical update package through a dealer for $49.) But before you double-click on the Installer, make sure your favorite programs are compatible with the new system, especially if you use system-intensive software such as network file-servers or spoolers.

The Mac system has improved considerably since the days when you risked a crash if you attempted to store more than 150 files on a hard disk. Today's System files offer more speed, features, and reliability than their predecessors, without sacrificing the Mac's easy operating style. And with more expansion options, closer ties to other computers, and still more system improvements on the horizon, 1988 promises to be a banner year.

As for me and my New Year, I'm not making any promises. The only resolution I'll see in 1988 is 72 dots per inch. □

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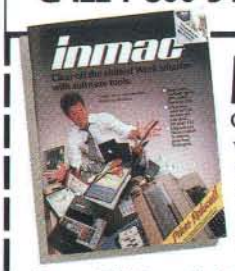


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Business Clinic

Switching to HyperCard–you can take your data with you

by Danny Goodman



SCOTT BALDWIN

It's incredibly difficult to get people to switch from familiar applications. Not only is there the comfort of knowing your way around a particular program, there is often a considerable investment of time in data entry, especially with database applications. My number-two computer nightmare (after disk failure of any kind) is reentering data. I type nearly 100 words per minute not because I like typing, but because I want to get it over with as quickly as possible.

If you've already built up a considerable database of names and addresses, for example, you'll need strong incentive to port it over to *HyperCard*–more than just knowing that *HyperCard* performs full-text searches blindingly fast and can link to other data-intensive applications. You'll want your database to transfer itself magically to *HyperCard*. If that's the case, well, have I got a *HyperCard* button for you.

Before we get to the magic inside this button, however, it's helpful to understand a few fundamentals about Macintosh files and file transfers. This knowledge should come in handy for any kind of data transfer.

The Nature of Macintosh Files

Nearly every Mac application stores its document data in a format unrecognizable by other kinds of computers. This is especially true of files containing information like textual enhancements and graphics, which other computers cannot handle. But even within the Macintosh realm, some programs store information in ways that other programs don't understand; word processing programs, for instance, are notorious for doing this. Only the early popularity of *MacWrite* has made it possible to pass formatted documents from, say, *WriteNow* to *Microsoft Word* via file translation routines (which are a separate program in *WriteNow* but an integral part of *Word*).

Since text created in a Macintosh application must often be shared not only with other Mac programs but with IBM PCs or mainframe computers, there is a *lingua franca* that virtually all computers can understand called ASCII text. ASCII is a standard code system developed by the computing industry to facilitate text transfer. The code number 65 represents the uppercase letter *A* in ASCII. As long as two computers understand that, files may be passed between them.

Most Macintosh programs can accept ASCII text files as well as write them. That's what the Text Only choice means in the dialog boxes that let you save documents (see "The Many Faces of Export"). To accommodate this lowest common denominator, however, programs strip all formatting–like tab locations, boldface, and so on–from the file. Only the raw characters go to an ASCII disk file. When two programs cannot accept each other's own coded files, an ASCII text-file transfer is about the only route left.

For a complete transfer you must export information from one program to a text-only file and then import it to another program (see "Importing Intermediary"). Once the characters are in the document of the second program, you can save the text and any formatting you add in that program's preferred file format.

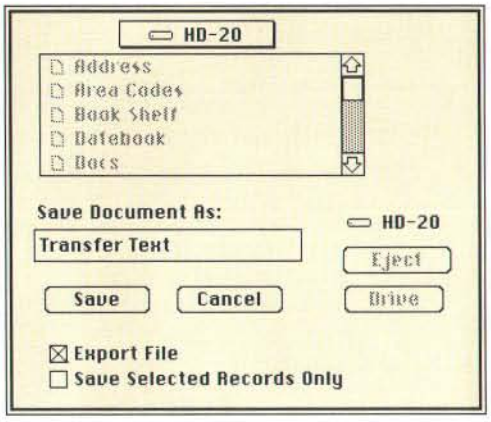
Database Files

If you follow the directions most database programs provide to set up a name-and-address database, your file probably consists of one field for each kind of information–one for name, one for company name, and so on, including separate fields

(continues)

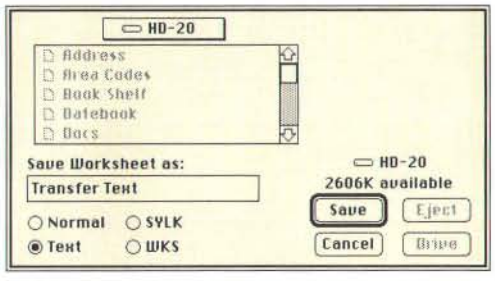
The Many Faces of Export

Not all database and spreadsheet programs adhere to the same methods for exporting their proprietary encoded data to a text-only format. Here are the interfaces for four popular products and the settings you should use to export data for the Import button: *Microsoft Works, Microsoft Excel, Omnis 3,* and *Double Helix.*



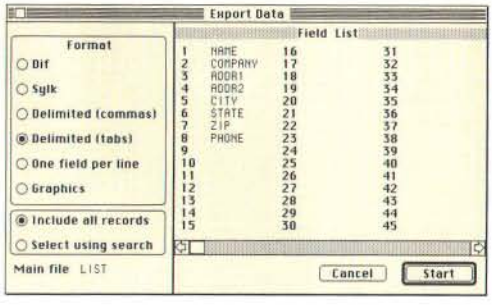
Microsoft Works

Works *provides an Export Data check box to save a database as an ASCII file.*



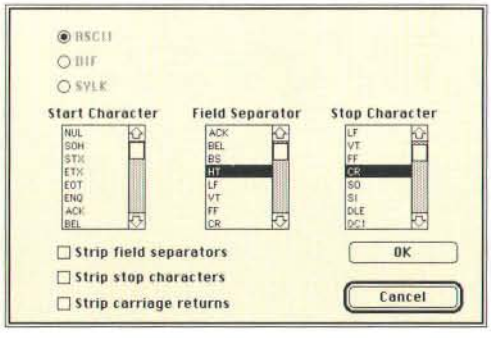
Microsoft Excel

Choose the Text format for exporting an Excel *database.* Excel *places a tab character between columns and a carriage return at the end of a row.*



Omnis 3

Omnis 3 *not only gives you more format choices, but it also lets you select individual fields and specify their order for the exported text file.*



Double Helix

Double Helix *is very flexible, offering choices of any ASCII character for database start character (none is required for the Import button), field separators, and stop character between records.*

for city, state, and zip code (see "Conventional Contacts"). Each form is called a record. For databases, it makes sense to break down information into tiny field elements and records because then you can sort according to any field or select records meeting search criteria for one or more fields.

The tradition in Macintosh file exporting has been to place a tab character between fields and a carriage-return character between records. Even if a field in a record is empty, the export facility puts a tab in the file so that all records appear to have the same number of fields. Not coincidentally, this is the same format that spreadsheet programs such as *Microsoft Excel* use to export columnar data. When writing a spreadsheet to a text-only file, *Excel* places a tab character between cells in the same row and a carriage return at the end of a row.

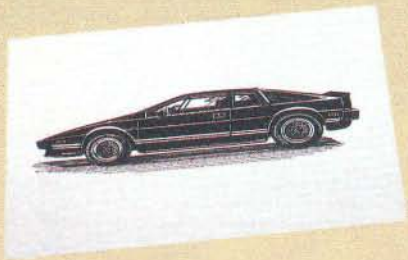
Omnis 3 and *Double Helix* offer additional flexibility for exporting data. *Omnis,* for instance, provides five methods for formatting text. *Helix* goes much further, by offering a list of all possible characters that you may wish inserted between fields and records. The default settings are HT (horizontal tab) between fields and CR (carriage return) between records.

Data from each record's fields are stored on disk in the order in which the fields were created. Thus, in *Microsoft Works,* if you create a database form and modify the order of the fields, the original order (field 1, field 2, and so on) remains in force, even though the tabbing order of the fields adheres to a sequence of top-left to bottom-right in the entry form. If the receiving program expects the data in a certain order, you must be sure to have your fields set in that sequence.

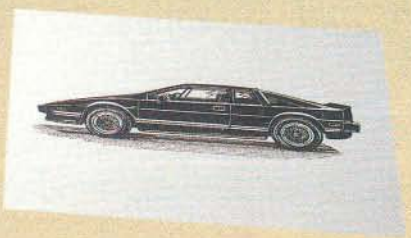
What HyperCard Wants

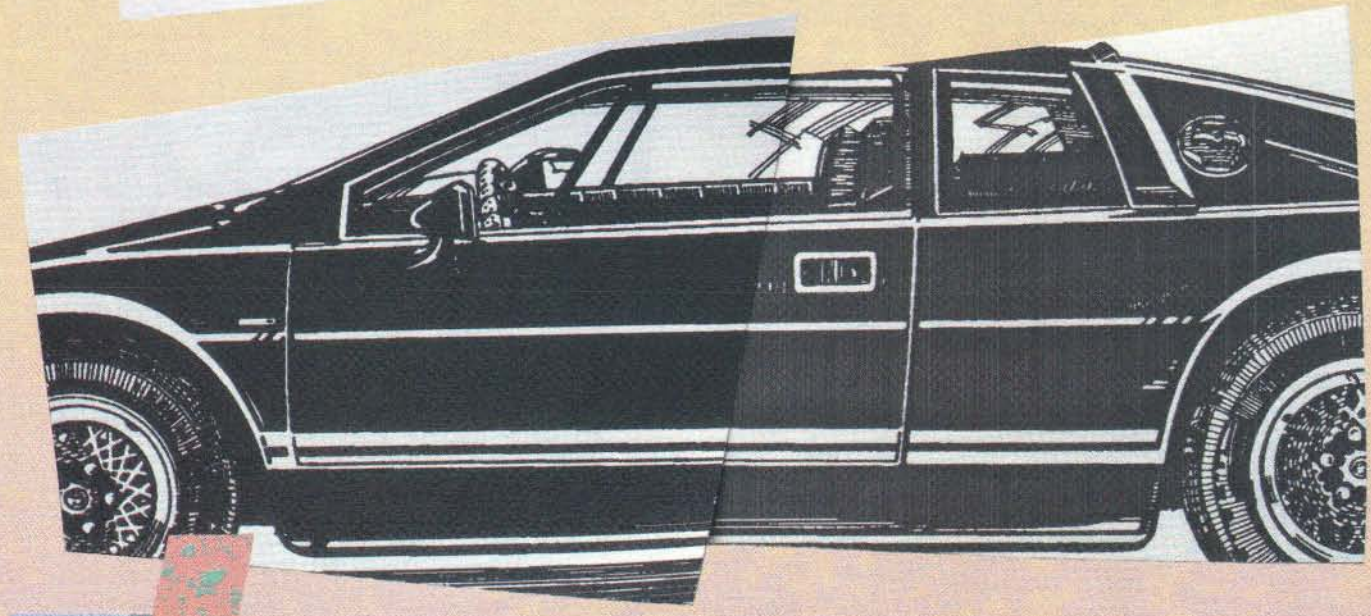
Unlike the typical database record, which contains many fields, the Address stack card in *HyperCard* has only three fields. Of these three, only two contain name, address, and phone data (see "A Stack of Contacts"). The first is a seven-line field, which (if you follow the format of the card as you received it) holds all name and address information. The second field holds the phone number. The third field, at the lower-right corner, is reserved for the stack: it's where the current date goes whenever you update information on a card.

(continues)



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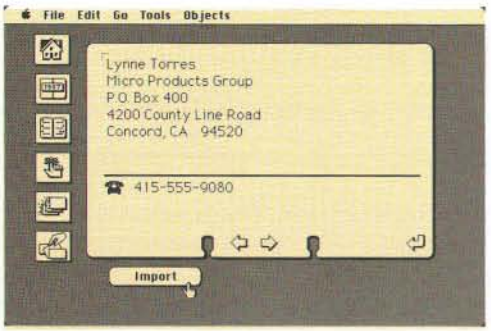


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A Stack of Contacts

This HyperCard *stack puts the name and address in one field and the phone number in another. The script activated by the Import button converts files from a database to this form.*

So in this case importing a database text-only file involves first reading the data and then combining data from several fields into *HyperCard*'s two fields. To that end, the script attached to the Import button featured here assembles name and address database fields into a single field in the *HyperCard* Address card; the phone number database field goes into the *HyperCard* phone field by itself. For demonstration purposes, I assume a starting database form that looks like the one from *Works* in "Conventional Contacts." Even if your database is set up differently, you'll need to make only slight modifications to the *HyperCard* Import button script to make it work.

Making the Import Button

Listing 1 contains the script for the button. To create this button in your Address stack, first make sure the User Level (in the User Level card of the Home Stack) is set to Scripting. Then go to the Address stack and choose New Button from the Objects menu. A new text button appears in the middle of the screen, preselected for you to drag to an unused area of the card.

Double-click on the button to see its Button Info dialog box. Type the name *Import* into the button name box. Then click the Script button. In the button's Script Editor box, you'll see the opening and ending lines of the script already entered, with the text pointer flashing between them. Type in the script as shown in Listing 1.

What Makes the Button Tick

To help you understand the script so you can change it to suit your purposes, here's a description of the *HyperTalk* commands, starting at the top. This button's script is set in motion when you click the Browse tool atop the button. The first thing that appears is a dialog box requesting the name of the file you wish to import. *Transfer Text* is supplied as a default file name. If you use that name when exporting your database data to a text file, you don't have to type anything into the dialog box; just click OK. (The file to be exported must be exposed in the window of the active disk–not hidden in a folder–for *HyperCard* to find and open it.)

The script places the file name you specify into a local variable, called fileName, and opens the file so that it can be read by *HyperCard*. Then the script sends you to the last card of the stack, where new cards will be added.

Repeatedly Reading

The balance of the script is a series of instructions that the program repeats until the script receives the signal that all importing is complete. The mechanism that stops the importing is within this repeat loop, so

(continues)

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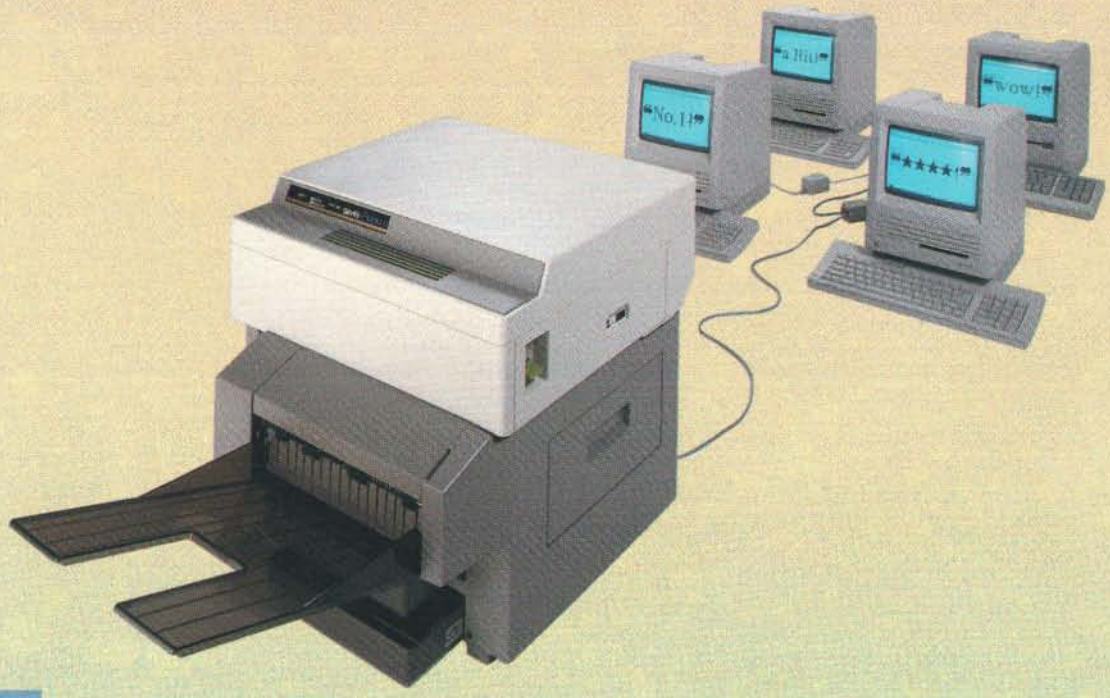
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there is no danger of getting into an "endless loop," even though the beginning instruction makes it sound as if it will go on forever.

First comes the creation of a new card to receive the first batch of imported text. Then comes another repeat construction nested within the previous one. This repeat loop reads the first seven database fields into memory one at a time and places them in appropriate locations in the Address card's first field. For instance, the first time through the loop, *HyperCard* reads information from the text-only file until it finds a tab character, which signals the end of the first field (in this case, *name*). Next, the tab is removed. As long as the first database field is not empty (if it is, that means there are no more database entries to be read and, therefore, the importation should end), the information just read into memory is placed in the first line of Address card field 1. The second item goes into line 2, and so on, from the first field to the last.

HyperCard encourages you to set up your Address stack in a more common format: city, state, and zip code on the same line (with a comma separating city and state). Therefore, the button's script treats specially the placement of the state and zip code data. For the sixth item (the State field), the script places a comma, a space, and the state data *after* the last entry to field 1, the city. The Put After command does not insert a carriage return. The zip code is similarly placed a couple of spaces after the state.

Now there's only one item left in the first database record, the phone number. As the last item, it's followed in the text file not by a tab but by a Return character. Thus, the script reads data from the file until it encounters a Return character and places the phone number into the Address card's field 2.

Works Database (DB)

Name	Lynne Torres
Company	Micro Products Group
Address 1	P.O. Box 400
Address 2	4200 County Line Road
City	Concord
State	CA
ZIP	94520
Phone	415-555-9080

Conventional Contacts

In a database of contacts, each piece of information goes into a separate field, as in this Microsoft Works *file.* HyperCard, *however, typically groups several fields together, so they must be combined during conversion to* HyperCard *to arrive in the right form.*

Using the Import Button

When you import data from some databases, you may find the first card holds the database structure instead of a record. A *Works* database text file, for instance, includes as the first record the names of the fields where the data normally goes. If you see this odd-looking card, simply delete it (⌘-Backspace is the shortcut).

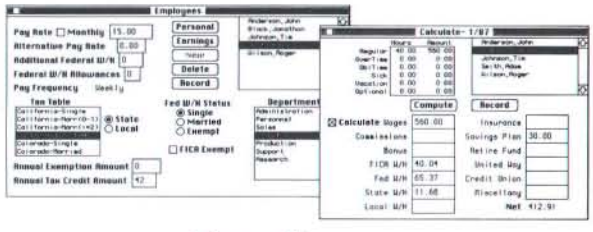
Also, this button script assumes that your database has two address lines. Database records with a blank second-address field leave an empty line in the *HyperCard* Address card. If that blank line bothers you, remove it just as you'd remove an extra line in a word processing document.

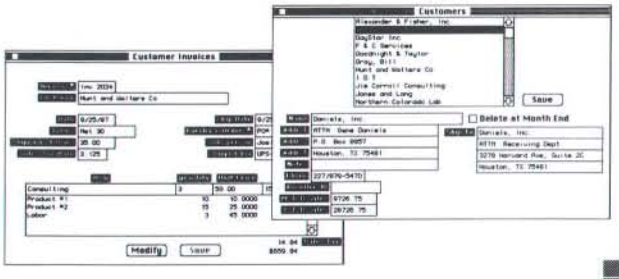
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```
on mouseUp
  ask "Which file do you wish to import?" with "Transfer
Text"
  if it is empty then exit mouseUp
  put it into fileName
  open file fileName
  go to last card

  repeat forever
    doMenu "New Card"

    -- read the first five database fields
    repeat with theItem = 1 to 7
      read from file fileName until tab
      delete last char of it -- remove the tab character

      if theItem = 1 and it is empty then
        doMenu "Delete Card"
        go to first card
        close file fileName
        exit mouseUp
      else

        -- first 5 items go into their own lines
        if theItem <= 5
        then put it into line theItem of field 1
        else

          -- sixth item (state) goes into same line as city
          -- seventh item (ZIP) goes after state
          if theItem = 6 then put ",  " & it after field 1
          else put "  " & it after field 1
        end if
      end if
    end repeat

    -- put phone numbers into second field
    read from file fileName until return
    put it into field 2

  end repeat
end mouseUp
```

Listing 1

The Import button script retrieves database information saved as a text-only file. Transferring data from a database program to HyperCard *needn't entail retyping.*

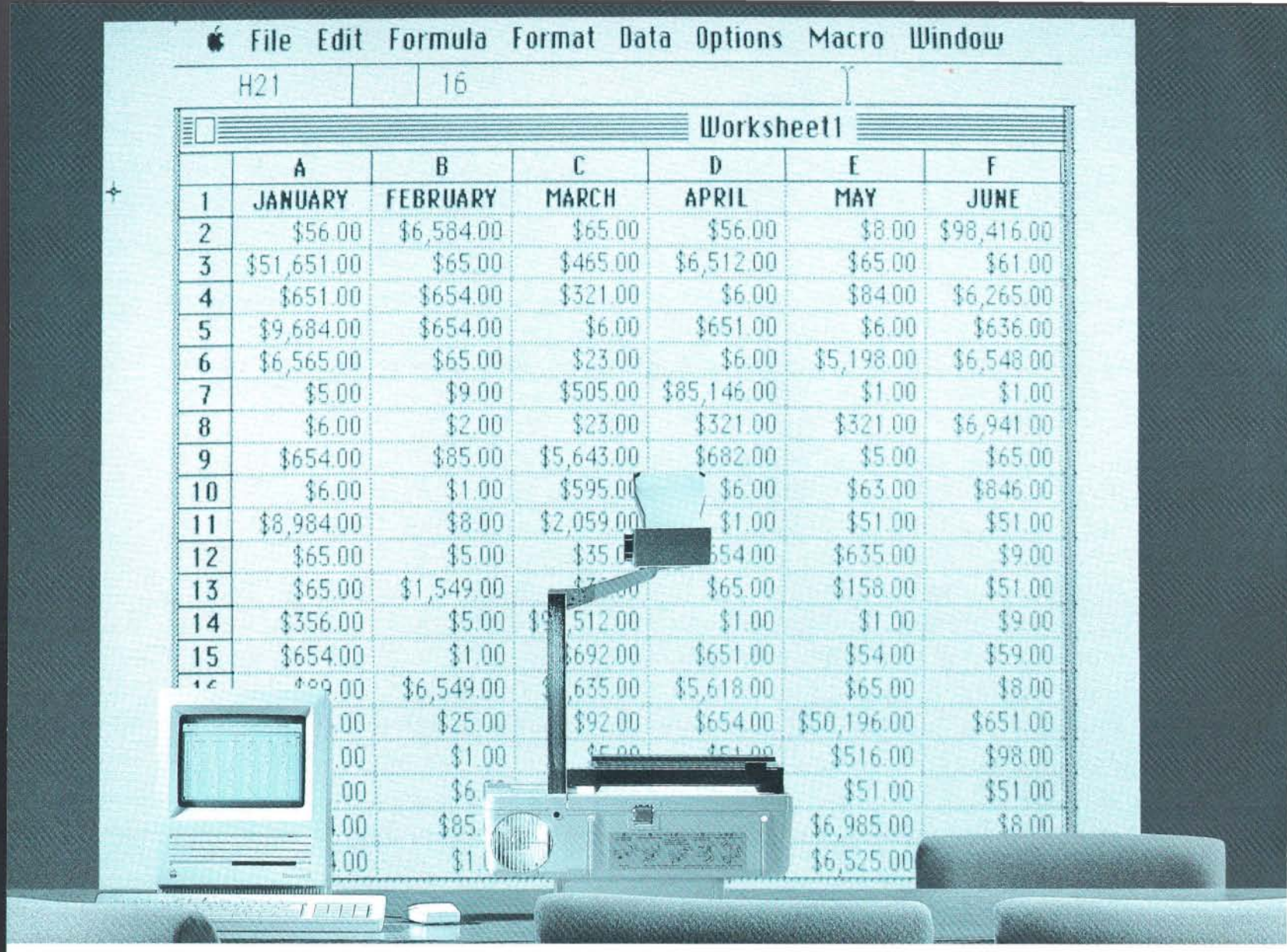
Modifying a Database to Fit

I noted earlier that the field order of some databases cannot be altered. For instance, if you create a name database like the one in "Conventional Contacts" but forget to add the Company Name field until the end (and insert it manually near the top of the form), that field will go into the export file last–something you don't want to happen.

To modify the field order, first save the database as a text-only file. Open that file within a spreadsheet program and cut and paste the columns so that they're in the desired field order. Finally, save the spreadsheet file as your Transfer Text file. When the Import button opens this file, the data will be in the correct order.

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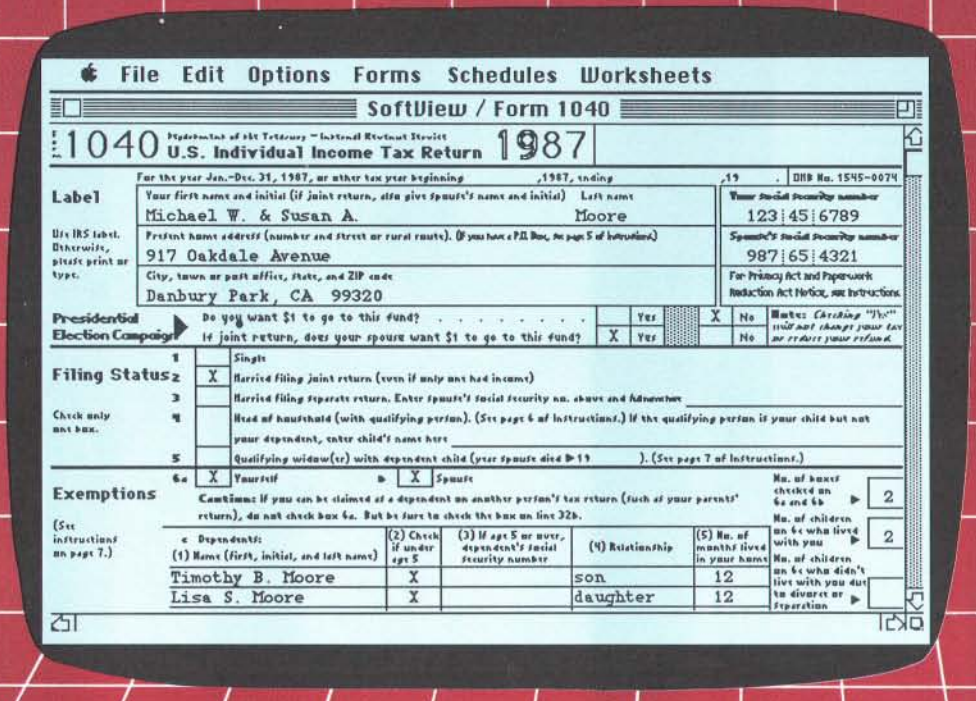
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Insights on Adobe Illustrator

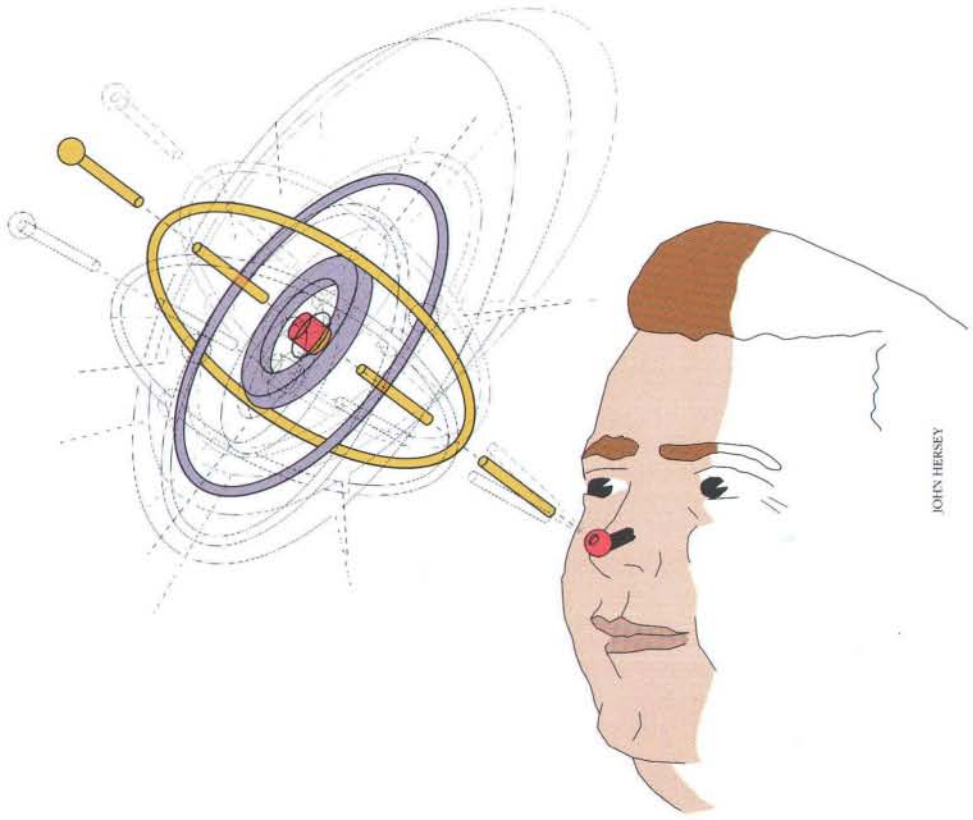
Tips for the path to proficiency

by Bruce Maurier and Kevin Rardin

Adobe Illustrator hit the drawing and drafting market with a splash a year ago. Though the program takes considerable time to learn, the professionals who have invested the effort to master it find that effort paying off daily in their publishing and graphics production tasks. Both of us are among the converts. After months of experimentation–and headaches–we've settled on *Illustrator* as the best tool for any kind of line art in our electronic publishing businesses.

Anyone familiar with the most popular Mac graphics programs sees immediately that *Illustrator* is a world apart. But much about the program's operation is not immediately obvious. Through working with the program on a daily basis and constantly referring to Adobe's complete but rather oblique manual, we have uncovered the techniques detailed here. We assume you have a basic understanding of *Illustrator,* but these tips will aid the casual user as well as the graphics professional who every day produces technical, marketing, or advertising line art.

Thanks to David Smith of David Smith/Design, Sausalito, California, for pointing us in the right direction.



JOHN HERSEY

The Driver's Seat

Illustrator's keyboard commands and mouse modes can put you in the driver's seat at your electronic drawing board. Until you gain proficiency in these keyboard shortcuts, working with *Illustrator* may seem frustrating and awkward compared to using traditional tools. When you are drawing with pen and ink, you just reach for a tool and draw with it. Similarly, with *Illustrator,* you can draw with the Pen tool, then press the ⌘ key and instantly reposition an anchor point to redraw a line. Or you can press the option key and the spacebar together, point at part of the page, and zoom in at 200 percent increments. You can't do that with pen and ink.

Study the shortcuts listed here and on *Illustrator*'s Keyboard Summary Sheet and experiment with them (see "Keyboard Shortcuts"). With your left hand on the keyboard and your right on the mouse, the only thing missing is an accelerator pedal.

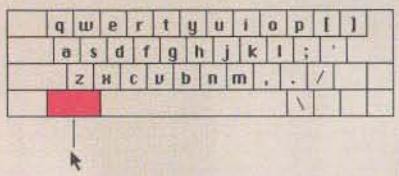
Joining Together

If you want to Join (⌘-J) the ends of two paths exactly, remember to Average (⌘-L) them first. The two points may only *appear* to be in the same place, separated by a pixel or two. Later when you scale, rotate, or reflect the figure, that little discrepancy can become a big headache. To avoid the problem, zoom to 800 percent, bring the two paths together until they touch, and then move them a bit closer so that they overlap by one little jump of the line

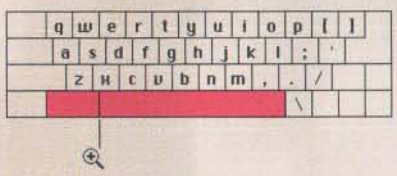
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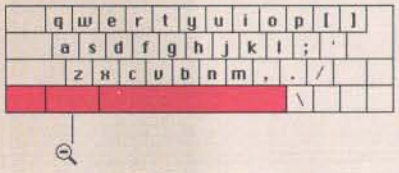
Press spacebar with any tool selected to select Hand Tool.



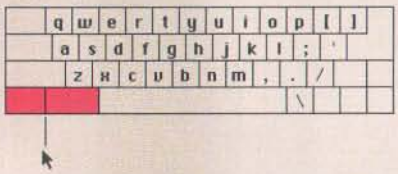
Press Command key at any time to access selection pointer.



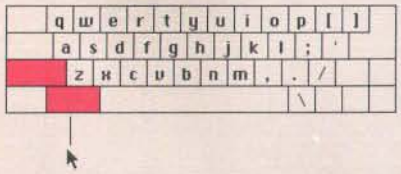
Press Command key and spacebar together to access zoom-in pointer.



Press Option key, Command key, and spacebar together to access zoom-out pointer.



Press Option key and Command key together with selection pointer (controlled with mouse) to select a complete path.



Press Shift key and Command key together with selection pointer to move whatever you're pointing at while constraining that motion to 90 and 45 degree angles.

Keyboard Shortcuts

Keyboard commands make short work of even painstaking Illustrator *procedures. Here is a handful of invaluable shortcuts that accelerate the drawing process.*

on your screen. When selected, the two anchor points should look like one–not one and a half. Now joining the two paths should not trigger that latent migraine.

Cutting Asunder

The Scissors tool chops circles, ovals, rectangles, and squares into the pieces needed for a drawing. You must ungroup (⌘-U) the shapes before cutting them with the Scissors.

For example, if you need a box with rounded corners, you might go nuts trying to do the job with the Pen tool. Instead, hold down the Shift and Option keys to draw a circle (from its center) with the same curve in one of its quarters that you want at the corner of your box. Ungroup the circle. With the Scissors, clip the circle's four anchor points to produce four equal quarter-circle arcs. Move the arcs apart, using the Shift key to keep them aligned. Now it's easy to connect the corners with the Pen to complete the box. If you want to specify in points exactly how far away the arcs should move, select two adjoining arcs using the Option key and the marquee. Holding the Option key down, select the pointer from the tool palette, type the number of points, and select Horizontal or Vertical. (Use positive numbers for right or upward movement, negative numbers for left or down.) Then move the third arc following the same procedure and connect all four arcs with the Pen to finish the box.

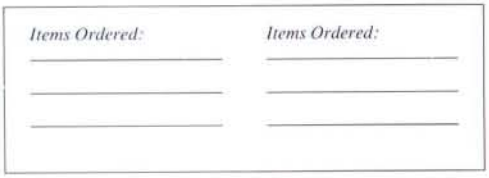
The Key to Alignment

When you begin using *Illustrator* for work that requires careful alignment, you quickly discover the program has no system of grids or guides that you might expect from other Mac graphics programs. Having committed to *Illustrator* for your project with no time to look back, you might think you'll just have to align everything by squinting–and by keeping a very steady hand on the mouse.

The manual's index and glossary suggest that alignment is something to do only with type. And even though you may have read everything the documentation has to say about constraint, experimented with the Shift (Constrain) key, hit ⌘-K, and sniffed warily at the Constrain dialog box, somehow the word *constrain* fails to convey *alignment*.

In fact, the secret to alignment is mastering constraints. When you hold down the Shift key during a movement in *Illustrator,* you force, or constrain, the object you are moving to follow one of eight exact paths. It is as though you are creating an invisible grid when you hold down the Shift key. In combination with the Option key and Transform Again command (⌘-D), you can use this invisible grid to solve most of the toughest alignment problems.

Consider a simple order form (see "An Orderly Approach to Alignment"). With no apparent grid, and only the aid of the rulers at the edge of the drawing area, aligning the eight elements would appear to be more trouble than it's worth.



An Orderly Approach to Alignment

By leaning heavily on Illustrator*'s Constrain option, you can easily create, move, or copy items in perfect alignment, whether for forms or for drawings. Here, an orderly form emerges in seven easy steps, as described in the text.*

Actually, you can easily align everything in the form with the first object you create, without ever resorting to the remote rulers. To make a form as in the example, first enter the left-aligned text, *Items ordered:*. With the Pen tool, click one to set an anchor point directly on the anchor point of the text block. While holding down the Shift key to force the new path to follow *Illustrator*'s preset axis of constraint, set the other end of the path horizontally to the right to draw the first line of the form.

Now Option-click to select the line, and then drag it away from the text. *After* the line begins to move, press the Shift key again to put it under the power of the invisible grid. When the line is in place, release the mouse button and then the Shift key. To position the line a specific number of

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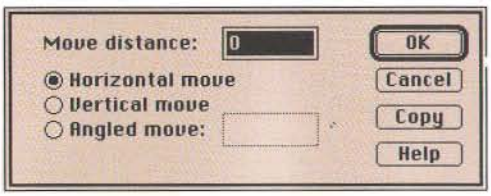
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points below the baseline of the text, instead of dragging it hold down the Option key and click on the pointer tool. Then specify in the dialog box how many points away you want the line to go–horizontally, vertically, or at an angle (see "Moving Pictures"). Use positive numbers to go right or up, negative numbers for left or down.



Moving Pictures

For precise positioning, use Illustrator's *dialog boxes to specify exactly how much–in points or degrees–to change an object. This Move box appears when you select an object and then hold down the Option key while clicking the pointer in the tool palette. Similar boxes appear when you select a transformation tool and then hold down the Option key as you click the object at its transformation point.*

With the line still selected, move it down again. But this time press Option along with Shift and then release the mouse button to place an exact copy of the first line below. (If you use the dialog box for the move, click Copy instead of OK to obtain the same result.)

With the second line still selected, press ⌘-D (Transform Again, on the Arrange menu) to create another copy perfectly aligned with the other two lines and the text above.

Now select all four elements, either with the marquee or by pressing ⌘-A (Select All). Click on any element and drag the entire cloned group to the right. Once the group begins to move, press Shift to hold the elements in perfect horizontal alignment with the original. When the group is in position, press Option (in addition to Shift) to leave an exact copy when you release the mouse button.

Finally, deselect the copy by clicking on the background and select the text in the copy without moving it. The surest way to do that is with the marquee–selecting an object in *Illustrator* with the pointer often moves it accidentally. Press ⌘-T (Type, on the Style menu) to bring up the Text dialog box. Type *Send to:* to replace the selected text. Don't change the type font, size, kerning, leading, or–most importantly–location. There is now no need for manual alignment. Everything has been aligned with the first element created, using only Shift, Option, and ⌘-D. Once you learn to keep the first, second, and third fingers of your left hand on the ⌘, Option, and Shift keys, the whole operation should take about 30 seconds.

The Angle of Repose

Illustrator's ability to make objects follow the eight horizontal, vertical, and 45-degree-angle paths would be merely useful if it weren't for the fact that the paths' orientation can be reset at any angle on the page (see "Illustrator's Compass"). A few words about adjusting the angle of constraint might be in order here.

There are two ways to change the orientation of *Illustrator*'s invisible grid. After selecting Constrain from the Arrange menu (or pressing ⌘-K), you can type the desired angle of the horizontal axis into the dialog box and all the invisible grid lines will rotate along with the horizontal axis, just like the example compass in the figure, always at 45-degree angles from one another. Typing a positive number rotates the grid counterclockwise; a negative number rotates it clockwise. The grid's new orientation stays in effect until you change it again–ready to go to work whenever you press the Shift key during the transformation of an object.

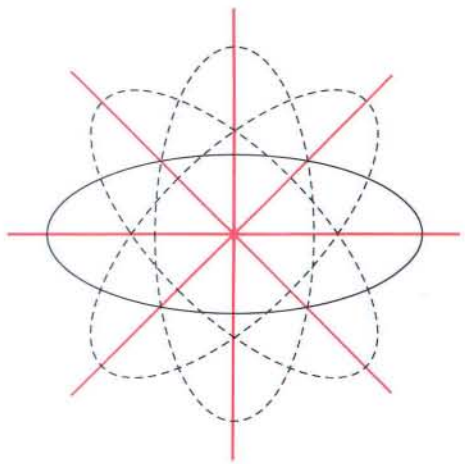
There is a second way to change *Illustrator*'s axes: create the line you want your customized invisible grid to follow. You can establish a new axis either by selecting two points of an existing straight line that has the correct angle or by selecting two anchor points in the drawing. With the points selected, press ⌘-K and the dialog box announces what angle you have selected. Click OK to accept the angle; all movements and transformations of objects will follow that angle whenever you use the Shift key.

Also, any squares, rectangles, circles, and ovals that you subsequently create align their symmetrical anchor points with the new grid. (Objects you have created before changing the axes do not shift, however.) This greatly simplifies the creation of axonometric drawings, as well as technical line drawings involving tightly spaced lines and complex perspective angles. Angles don't have to be figured, checked, and rechecked. With the help of the almighty Shift key, simple lines and complete figures can be forced to align with one another along the same invisible lines. Even text follows the current angle of constraint.

Using any of the transformation tools–scale, rotate, reflect, and shear–with the Shift key forces the transformation to follow the same invisible grid.

For example, holding the Shift key down while scaling an object restricts it to expanding or shrinking only in the grid's eight basic directions. Rotating an object about a point with Shift held down forces it to snap into one of eight positions. When you reflect an object while pressing the Shift key, the reflection can appear across only one of the eight angles. And the orientation of an object you shear while holding

(continues)



Illustrator's Compass

Ordinarily Illustrator's *angles of constraint match the eight points of the compass in the center foreground of this drawing, but you can reset the angles. You can rotate, scale, shear, or reflect objects along the constrained paths–just press the Shift key while executing the transformation. Here, the rotation and scaling were limited to 45-degree rotations, making a complex geometric design easy to create.*

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down the Shift key follows–you guessed it–any one of eight angles. With judicious use of the Option key you can create copies of the original object in perfect alignment with the original. By scaling, rotating, reflecting, or shearing, you command a wondrous array of special effects.

For us lowly mouse jockeys, however, the most important use of *Illustrator*'s invisible grid comes in the daily demands for tables, graphs, charts, logos, icons, and simple but elegant line drawings. What once might have taken hours with pen, ink, protractor, and T-square now takes only a fraction of the time. Select, move, Shift/Option, release, ⌘-D, ⌘-D, ⌘-D...

No grid in *Illustrator?* Hah.

Through the Looking Glass

A trouble spot we encountered when learning *Illustrator* was in mastering the Reflect tool. It's easy to understand if you take its name literally. Use this tool as if you were setting the edge of a mirror down to reflect something you've drawn. You set two points with the tool to define an imaginary line that represents the edge of the mirror. If you hold down the Shift key while doing this, the reflection aligns with one of the current angles of constraint. If you hold down the option key, the reflection leaves the original in place and creates a copy across from it. We often use the Reflect tool to create the other half of a symmetrical figure, copying across the vertical and horizontal axes and then joining the connecting anchor points.

Incidentally, we rarely trust fate by reflecting objects–or for that matter, scaling, rotating, or shearing them–manually. Whenever you employ one of *Illustrator*'s four transformation tools, hold down the Option key when you click to establish your first point in the drawing. The dialog box that appears allows you to specify exactly how much and in which direction you want things to happen. And ⌘-D allows you to repeat any operation as many times as necessary.

The Skinny on Scanning

Although people use *Illustrator* as a freehand drawing system, Adobe designed it primarily to be used with scanned im-

ages called templates. Preparing the scanned image properly can save hours of time in obtaining a satisfactory working image. A scanned image is brought into *Illustrator* as a bit-mapped image on a non-printing background.

There are several adequate scanners on the market, but our current favorite is Thunderware's ThunderScan unit. For the price it is the best digitizer for black-and-white line art, though it works better with the ImageWriter I. The software that accompanies ThunderScan lets you manipulate the image in FatBits directly in the scanned-image window. Alternately, you can export a single page of the image to your favorite paint program (*MacPaint, FullPaint,* or *SuperPaint*) and doctor it there.

The most common complaint about scanned-image templates in *Illustrator* is that they end up being skewed or distorted. You can avoid this with a little care. If you start with a photocopied image, take the time at the copier to make sure your image is properly aligned on the page. Run test copies of the original until you are completely satisfied with the alignment. If you are copying the image from a book, flatten the pages on the copier glass. Excessive curl on the pages distorts the copied image. Make sure there is plenty of white space surrounding the image, especially at the top of the page.

When you take the photocopy to the digitizer, again make sure the image is lined up squarely for the scanning head or on the glass surface of a flatbed. Position the photocopy against the printer's platen; pull it about halfway way through the roller with the paper bail pulled away from the paper and the tension released. Now square up the image, using the paper bail as a guide. If the image is slightly skewed on the photocopy, skew the page to compensate so the *image* is lined up in the printer. Engage the tension, put the paper bail against the photocopy, and scan.

On a flatbed scanner you may need to scan repeatedly until you get the alignment just right. It is far easier to square the image now than to try to fix it in a paint program.

Remove artifacts of the digitization process–spurious dots and shadows–from the scanned image with the eraser in ThunderScan's image window or in your favorite paint program. You may want to go into FatBits to quickly eliminate the finer artifacts of digitization. You want to start with the cleanest template in *Illustrator,* so your tracing will accurately represent the original art. Tracers less finicky–or more hasty–than we are might be content to merely overlook the extraneous dots as they go along.

Clipboard Realities

A great deal of confusion and controversy surrounds the issue of importing *Illustrator* art into other Macintosh programs. Even if you're not using a program (such as *PageMaker*) that supports the Encapsulated PostScript Format (abbreviated EPS or EPSF), you can import *Illustrator* art in PostScript form into most programs that support the Macintosh Clipboard or Scrapbook.

The key to profitable exporting is pressing the Option key when you copy. That makes a PICT-format image of what you've selected to copy from *Illustrator.* However, this is no simple PICT image. Embedded in it is the PostScript code necessary to draw the image after you paste it into a program such as *Microsoft Word* or *ReadySetGo.* As long as the program supports the Clipboard properly (which is not always the case) the image should print properly. Try this for yourself with your favorite applications. We have confirmed that this process works for *Trapeze* 2.0, *Microsoft Word* 3.01, *ReadySetGo* versions after 3, and *PowerPoint.* One exception we've indentified is *Cricket Draw* version 1.0, which makes an odd array of boxes instead of the image you expect. And if you export an *Illustrator* image into a paint program, it becomes a simple bit map.

More Tips

If you've uncovered a tip or shortcut we haven't included in this article, send it to *Macworld.* The magazine pays $25 to $100 for hints published in the *Quick Tips* column. Send your contributions to *Quick Tips, Macworld,* 501 Second St., San Francisco, CA 94107. □

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Mac Charting Tools

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by Michael Alexander

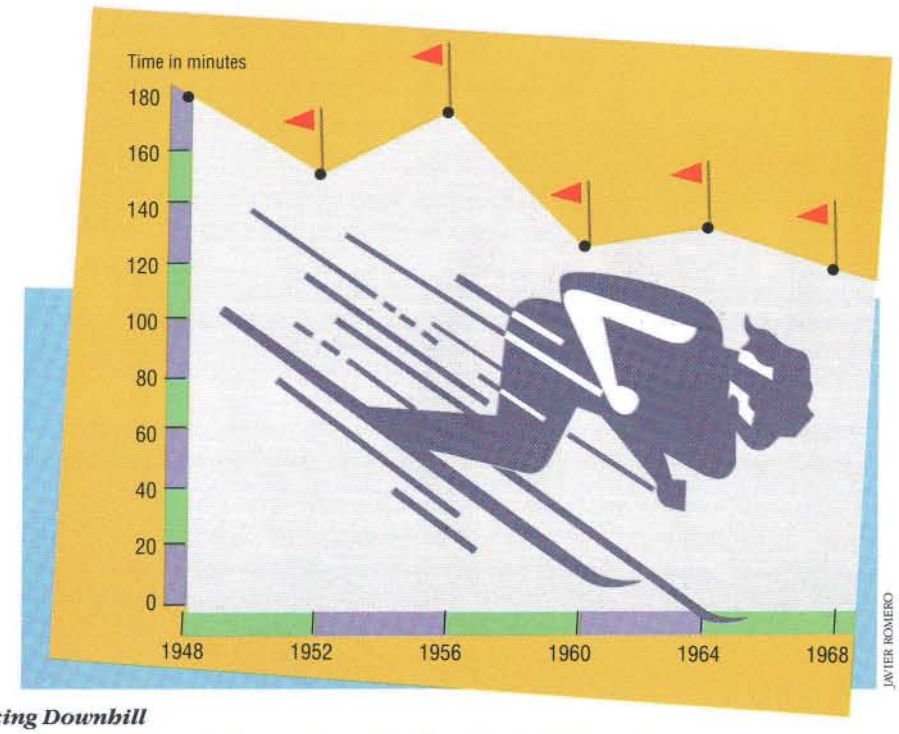
Look at the chart on this page. Now turn the page to see the table entitled "Downhill Ski Stats." They both say the same thing; the chart says it faster.

Charts and graphs are visual, and in this case a look is worth the 102 boring words I wrote–and discarded–that would have explained the trend in Olympic downhill skiing. A chart helps viewers quickly understand the relationships that series of numbers represent.

In business, numbers are for bean counters, trends and summaries are for decision makers. Corporate annual reports, the *Wall Street Journal,* and the weekly news magazines have long been filled with graphs (or charts, they're the same thing). Your local paper probably prints more graphs these days, thanks to the influence of *USA Today,* which discovered how much readers love the way graphs present information, and thanks to the Macintosh, which makes graphs easy for newspaper artists to produce.

The Mac also makes it easy for individuals to create their own charts and graphs, particularly with an integrated spreadsheet and graphing program like *Microsoft Excel.* According to Microsoft, more than 75 percent of *Excel* graphs created are used for presentations. If you use charts to persuade or inform others, this article can help you increase the power of your visual communications.

The following assumes that you've done some *Excel* graphing. If you haven't, you'll still be able to follow along, but you might also want to refer to the chart section of Douglas Cobb's *Excel in Business* (Microsoft Press, 1985), a good tutorial. Better yet, throw away Microsoft's often incomprehensible manual, and use Cobb's book for reference, too. For a quick decoder of *Excel* chart terminology, see "Chart Parts."



Racing Downhill

Winning times for Olympic skiers. From an Excel *graph, the artist created this vivid chart in* Adobe Illustrator.

One last thing before we begin: a bow to Nigel Holmes of *Time* magazine (see "A Chart Master's Advice"). Holmes is the acknowledged master of making statistics understandable and interesting, and his ideas are the foundation of this article. Some of his magic depends on graphics arts skills that are beyond the ability of most people in business, but Holmes's success stems primarily from an inventive mind, a ready wit, and clear analysis. You can apply the same qualities to your graphs.

Column, Line, and Pie

The type of chart you choose depends on the data you want to show. *Excel*'s Gallery menu offers seven types of charts, but I will focus on three major categories.

■ *Column charts* Column charts show quantities. The height of each column represents the amount of data being

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Downhill Ski Stats

Year	Winning Time (in minutes)
1948	2:55.0
1952	2:30.8
1956	2:52.2
1960	2:06.0
1964	2:18.16
1968	1:59.85

These skiing statistics are the basis for the much more engaging chart on the previous page. Which way would you rather present increased productivity? Charts give dull numbers a lift.

counted. By comparing column heights for different products sold, for example, you can easily see the relationship of the quantities and tell which sold the most. That's why column charts are good for comparing quantities for a given time period. You can also use a column chart to show how the quantity of a single product changes over time, but do so when you want to emphasize the quantities themselves.

Bar charts are horizontal column charts, and they provide one advantage when you're working with *Excel* on the Macintosh. *Excel*'s plot area and the Macintosh screen are both horizontal. A simple and clean horizontal chart in *Excel* allows up to 15 products to be ranked, and there's more room for labels along the vertical category axis.

If you have too many bars, arrange products in small groups and plot those. Then make a summary chart of the groups. When you have lots of data points, consider a line graph.

■ *Line graphs* With a line graph, you can show trends as quantities change over time. Instead of emphasizing the quantities, line graphs highlight change. (The British call them fever charts; traditionally, the line graph has been used to track the rise and fall of temperature.)

(continues)

	A	B	C	D	E
18					
19		1984	1985	1986	1987
20	Kitty Nibbles	22.8	39.1	45.5	57.3
21	Cat Chow	36.7	38.9	40.2	45.3
22					

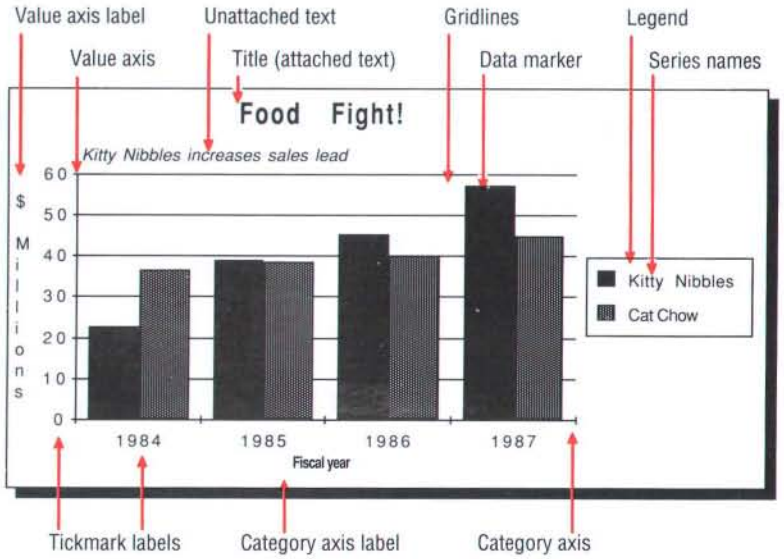
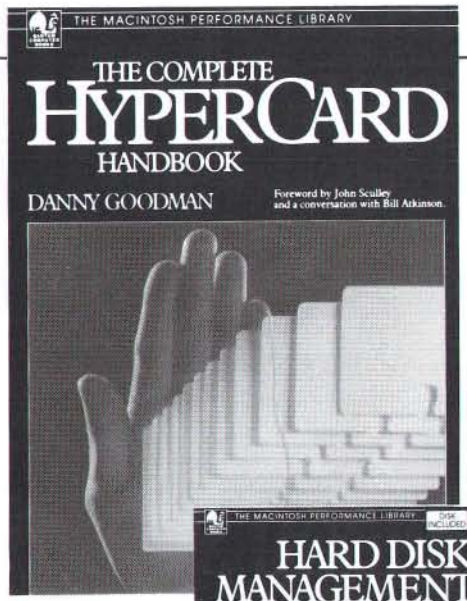


Chart Parts
Excel's spreadsheet-column labels become chart-category tickmark labels; the sales figures turn into chart columns. Data for a single variable, like all the sales for Kitty Nibbles, is called a data series.

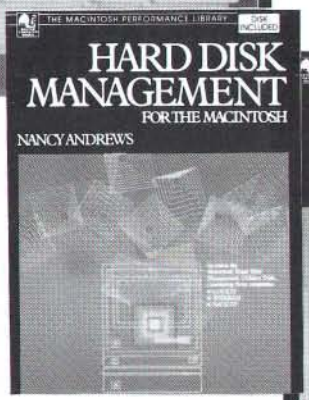
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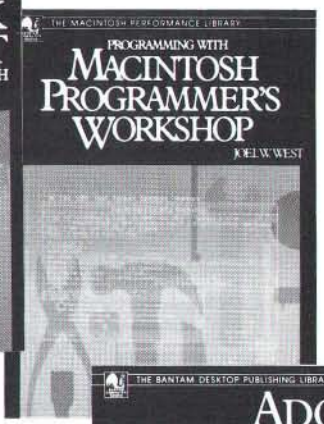
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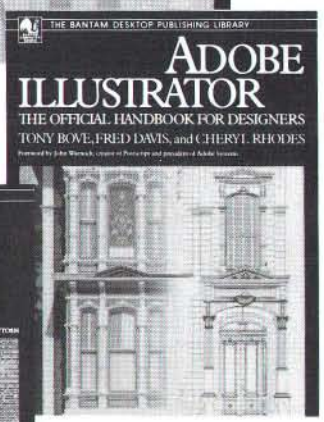
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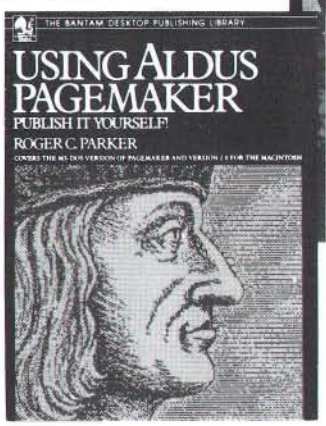
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The time period goes on the horizontal (or category) axis, and quantities on the vertical (or value) axis. You may confuse readers if you flout this convention.

Each data series you plot produces a separate line. This is useful for comparing the trends of different products over the same time period, but rarely can a chart show more than four lines without confusion, particularly if the lines intersect.

■ *Pie charts* These are best for showing quantities as proportions of a whole. If you're dealing with percentages, consider the pie chart first. A pie represents just one data series; the slices are the data points. Avoid thinly sliced pies–more than eight slices are hard to label and read. It's possible to compare two pies if each has just a few wedges. For example, one pie could show the proportion of teenagers, young adults, middle-aged people, and the elderly in the American workforce in 1970; another could show those proportions in 1980.

As you can see, your data largely determines which of the three chart types will best present your data. With *Excel,* however, you can experiment a bit. The program's ability to create simple charts easily on screen allows you to switch quickly among different types of graphic representation. But before you create finished charts for presentation, take some time to analyze what data you want to graph–and to prepare your spreadsheet.

What's the Point?

Charts are for communicating. Ask yourself some questions to make sure you're on the right track before you prepare them.

Naturally you understand the chart, but will your audience? Will the chart draw attention to the most important information? Who will see the chart? Specialists, or just folks? Large group or small? Is the subject of the chart entirely new to your audience or are you updating material they know? How much time do you have to inform them?

What is the most important number, or numerical relationship, you want to convey? Once you pin that down, you know the message of your first chart. If you present other information on the same chart, will it obscure your main idea?

Consider whether your purpose is to inform your audience or to persuade them to take action. Then evaluate the tone of your presentation. Can you perk up interest by using catchy titles or subtitles? Should

(continues)

A Chart Master's Tips

Time magazine's Nigel Holmes says, "Whatever computer programs do to plot statistics, you have to do more to lodge them in peoples' brains."

Holmes adds a visual symbol that tells the readers what a chart is about. "Since you're doing a visual anyway, say visually what the numbers are about. If you're showing automobile sales, instead of a bar chart, make a car chart."

Chart Art

Not many business people have the graphics talent to create the kind of charts that Holmes advocates, and it would be hard to justify such effort and money for, say, a department planning session. But companies spend a lot of time and money on presentation visuals, and that's where graphic artists come in.

Holmes says show your *Excel* charts to the artist. "Then explain the point of the chart. The illustrator can help you make that point."

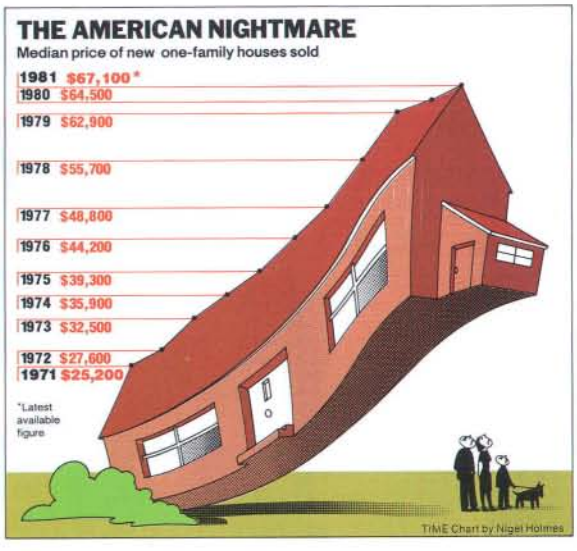
When Holmes came to *Time* in 1978, "charts were necessary evils." He turned them into one of the magazine's distinctive features, and himself into the magazine's executive art director. His charts are often funny and always imaginative. "But I'm not just dressing up the numbers," he cautions. "If the readers don't get the statistical information, the chart fails."

Presentation

Holmes's graphs are memorable, but he's also famous for his presentations to live audiences.

"Any presentation," he says, "is theater." He warns against showing long series of charts. Instead, he intersperses charts with photographs of the subject matter, and he changes the pace by turning off the visuals and just speaking.

In a recent talk at Stanford University, he projected a chart grid and used it as a background for a bar chart of helium-filled balloons on strings of different lengths. Oh, you prefer a line chart? Holmes whipped out a portable vacuum cleaner, blew up a 15-foot-long tubular balloon, and had a member of the audience hold it at a 30-degree angle as the graph line: sales were up. It brought the house down.



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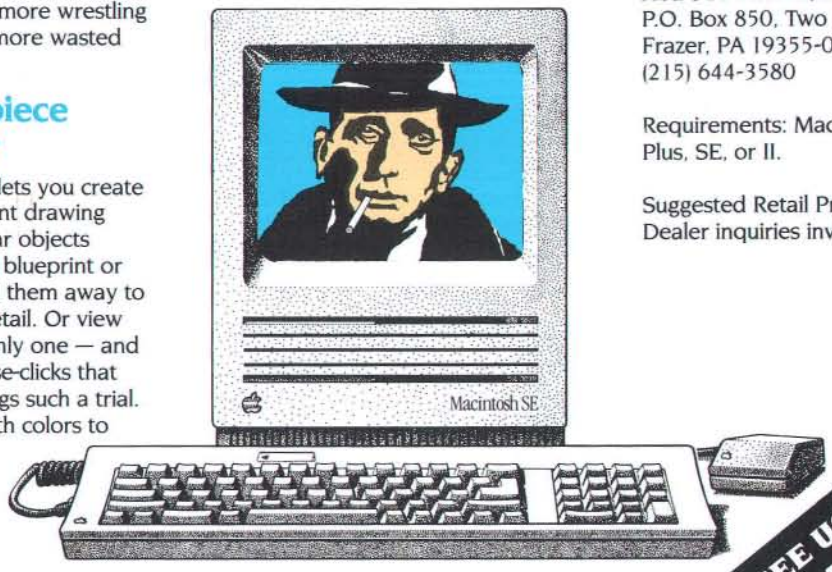
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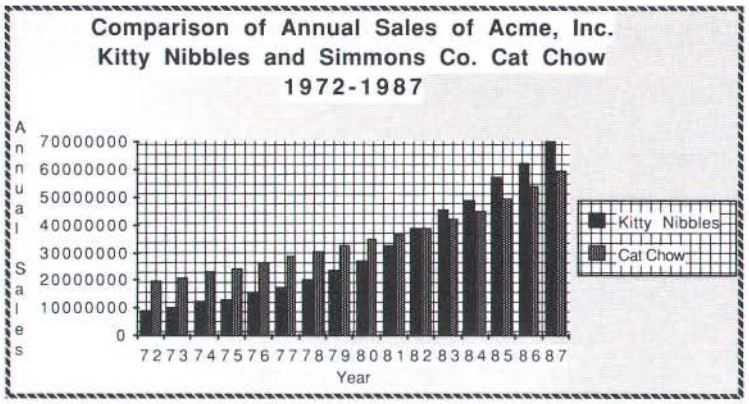
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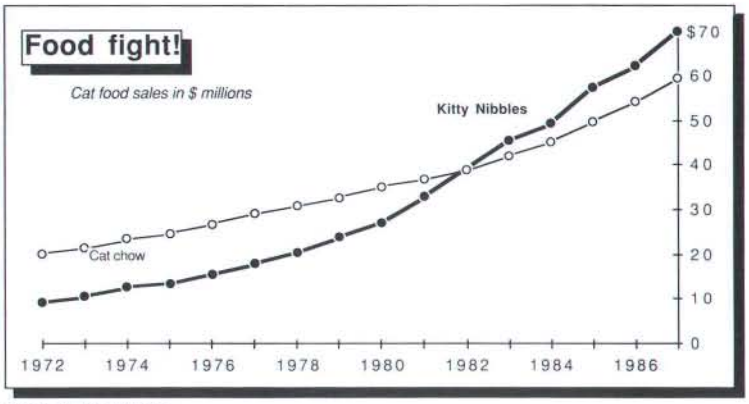
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Good Grief

What's wrong with this picture? Nearly everything. This Excel *chart is lost in a mass of visual clutter, and there's no source for the data. Most important, the column-chart style emphasizes each year's sales revenues of the two products, instead of the trend over time.*



Source: Cat Demographics

Good Graph

Compared with "Good Grief," this Excel *chart simply and clearly shows the underdog brand overtaking the leading brand.*

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the chart go to a graphic artist for embellishment?

Your answers will tell you what style of chart to use, what data to present, and how to present it. Once you've answered the questions, it's time to open your spreadsheet.

Lining Up the Numbers

Complete your spreadsheet design before creating any charts. If you change the *location* of cells in the chart selection, *Excel* may chart the new data incorrectly. Changing data within cells causes no problems, but if you must relocate cells, make a new chart–just to be safe.

The best format for a spreadsheet may not provide the best foundation for a chart. Spreadsheet labels may be too long. Cells or arrays you want to plot may be scattered across a worksheet. Cell formats get in the way of graphing. Blank lines that make the data more legible on the spreadsheet may create blank data series on a chart. Such discrepancies can cost you much time cutting, pasting, reformatting, and chasing around the spreadsheet. Instead, create a separate charting section on your spreadsheet with its cells linked to the main spreadsheet cells. Or create a separate worksheet linked to the main worksheet.

In the chart section of your worksheet, watch out for distracting trailing zeros in labels. Graphs are for summary, not for precise detail. When you chart numbers, such as the tickmark labels on the value axis, round them off so only the significant digits show. In the "Good Grief" example, all those zeros in the tickmark labels ($10,000,000 through $70,000,000) cause viewers' eyes to glaze over–and take up space you'd rather use for the graph. Round the numbers to 10 through 70 and note in the subhead that the values are millions, so viewers can digest the data more quickly (see "Good Graph").

Creating a Chart

To create a chart, select a continuous range of cells (containing data and labels) from the spreadsheet. Choose New from the File menu and double-click Chart in the dialog box. (The keyboard shortcut is ⌘- N, C, O. Don't bother waiting for the dialog box before pressing the letters.) *Excel* cuts and pastes the selected data into a default

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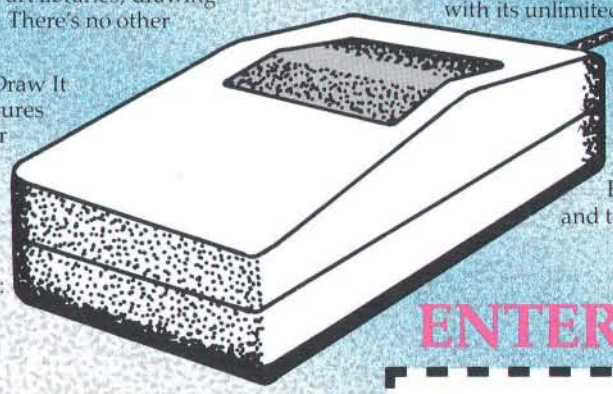


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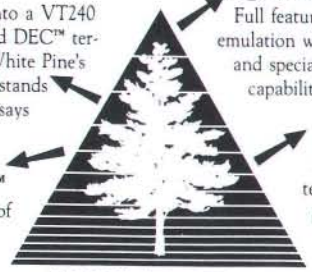
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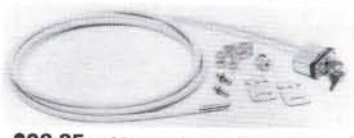


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column chart. Choose another of the 42 chart types from the Gallery menu, and *Excel* instantly redraws the data in that style. (For a quick review of *Excel* chart terminology, see "Chart Parts.")

If you have settled on a type of chart, make that the default. Select the type from the Gallery menu, then choose Set Preferred Format from the Chart menu. After that, no matter what chart type you're using, you can convert it to your preferred style by choosing Preferred from the Gallery menu.

Most people use the Gallery to select a chart type. That's fine. But if you add unattached text, patterns, special formatting, and other embellishments, you'll lose most of your custom settings when you switch chart types in Gallery. Instead, change the chart type by selecting Main Chart Type on the Chart menu.

What's the difference between making a Gallery selection and starting from Main Chart Type? The Main Chart Type and Main Chart commands give you control over the entire palette of *Excel*'s chart types. The Gallery offers you a limited selection—the most common types. You can be a painter who starts with a blank canvas, or one who paints by numbers.

Customizing Details

Once you have a chart type that will best display your data, you may want to change other preferences, too, such as sizing and typeface. Before you begin modifications, though, establish the finished size of the graph and resize the window accordingly. Click the zoom box of the window to view a screen-size chart instead of *Excel*'s little default size. Then resize to fit your finished layout. Otherwise you may waste a lot of time making refinements only to discover that all the category tickmarks overlap when you print smaller than the size you worked on.

Now, on to the fine points. Even experienced graphers often don't realize how much graphic control *Excel* offers. You can customize nearly every aspect of a chart by choosing Patterns or Text from the Format menu. Try it out by selecting an element, say the background or the border of the legend, selecting the appropriate command, and then experimenting with the options in the dialog box. As you explore, the *Excel* manual's miserably cryptic explanations of these features will begin to make sense.

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Lies, Statistics, and Graphs

Graphs lie. Better than raw numbers. Take a line graph, for example. Its most memorable feature is the slope of the line. A steep angle up means profit sharing for everyone. A steep angle down means look for a new job.

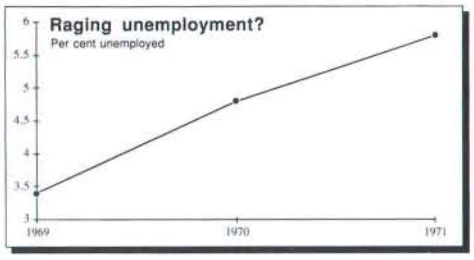
In truth, success or failure may be concealed by the graph's scale. When one axis represents time, slope can be correctly interpreted only by examining both scales.

From "Graph 1," it appears that unemployment was high in 1971. But was it? Not if you refer to "Graph 2." Uneven time series, as in "Graph 3," can produce equally misleading results. And of course, if you want to appear to say something while saying nothing, show a graph without a scale. There are dozens of ways to distort statistics with your graphs. A few traps you might fall into with *Excel* are listed here. For a whole book on the subject, consult Darrell Huff's *How to Lie with Statistics* (W.W. Norton, 1954).

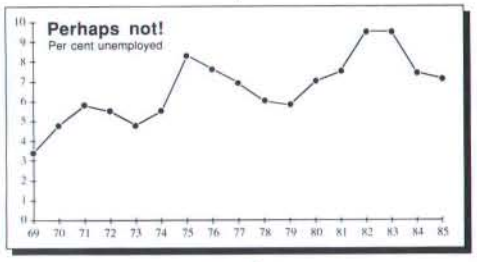
The stacked-line charts you can create with *Excel*'s Main Chart dialog box are nearly impossible for the reader to sort out; don't use them.

If you use symbols instead of oblongs in column or bar charts, watch for subtle distortion. A manufacturer that sells four times as many cars ought to show four more car symbols than the other maker, not one car symbol four times as big—that would make it 16 times greater by volume.

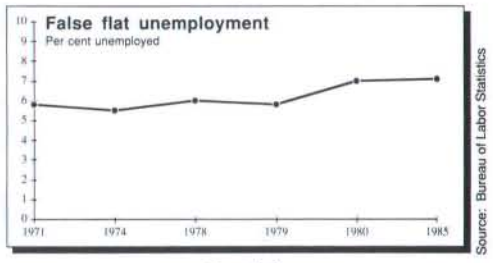
This recitation is not an exercise in moralizing, though graphic liars tend to be struck by particularly scenic lightning bolts. The worst data distortions are unintentional.



Graph 1



Graph 2



Graph 3

One thing you'll discover is that *Excel* can go pattern crazy. If your taste in clothes runs to plaid jackets worn with diagonally striped pants, paisley ties, and tie-dyed shirts, *Excel* offers the opportunity to express your visual sophistication. You set the background pattern by choosing Select Chart (or ⌘-A) from the Chart menu. I recommend sticking with the default Invisible. The other chart background patterns produce a jarring contrast with the white field that automatically appears under any type. Sure it's legible. It's also ugly.

Some background patterns may look OK in the plot area, as long as no text appears atop the pattern. Be careful of the grid pattern, though. It masquerades as the chart grid, but only on close examination will the viewer realize it's just a design whose lines don't have anything to do with the axes tickmarks. The horizontal-lines pattern is similarly misleading. If you need grid lines, choose Axes from the Chart menu, and click the boxes you want.

If you like a border around your chart, try adding a shadow border for a three-dimensional look.

Should you choose Text from the Format menu and click OK, *Excel* will change all text in the chart to whatever settings were selected. Do it by mistake, and all your carefully formatted text turns into Geneva 10. Undo-ably.

The Category Axis

Often the category tickmark labels don't fit comfortably on the axis. Abbreviate when you can—one- or three-letter abbreviations for months, for example—on the charting area of your spreadsheet. You've gone too far, however, if viewers don't instantly know what your shorthand represents.

To avoid overlapping names, label only every second or third tickmark. Select the category axis and choose Axis from the Format menu; then in the box, type the desired interval between labels. Typing a 2, for example, places a label on every other tickmark.

The category axis label often repeats the title, subtitle, or tickmark labels. Edit your wording; the world knows that 1986, 1987, and 1988 are years.

If a column chart lacks space for the

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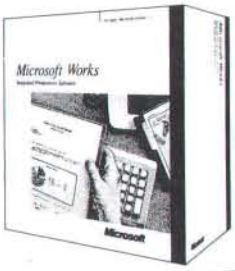
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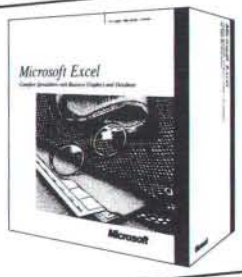
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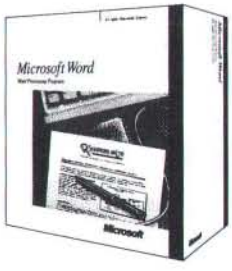
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category tickmark labels, try switching to a bar chart. Even in bar charts, keep the category labels short so the text doesn't dominate your visual message.

The Value Axis

Excel places the value axis on the left of the chart. *Time* magazine's Nigel Holmes argues that it often more naturally belongs on the right, because our eyes usually go to the most recent data first. To put the value axis on the right, click on the category axis, and choose Axis from the Format menu. Click Value Axis Crosses at Maximum Category and click OK.

Try not to label the value axis. If the label is horizontal, it seriously reduces the space left for the plot area. If the label is vertical, it's ugly and nearly impossible to read.

If the data cells on your spreadsheet are in dollar format, all the value tickmark labels will show dollar signs before them. Avoid the visual clutter by using a plain format, such as 0, #,##0, or 0.00, on the spreadsheet. Later, when you tidy up your chart before final printing, create a dollar sign in unattached text, and drag it to the top of the value axis.

When *Excel* creates a graph, it determines the scale by the maximum and minimum values of the data. More often than not, *Excel* makes a good choice, but it often plots values from a starting point greater than zero. This can make data plots look more volatile than they would look in a historical context.

Deciding whether to start the axis from a point other than zero is a very difficult judgment call, and Holmes says he's becoming increasingly conservative on this issue. He cautions not to abandon zero unless the bottom of the data range is high and the variation among data points is small. An example would be a graph of the weekly Dow Jones industrial average, which (at press time) starts around 2000 points and typically varies by only 100 points even on a bad day. Plot that from zero, and the variations disappear.

To redraw a graph using zero as the minimum value, select the value axis, choose Axis from the Format menu, double-click the value in the Minimum box, type 0 (zero), and click OK. If you prefer *Excel*'s original plot, return to the Axis dialog box and click the Automatic box next to Minimum. Of course, you can choose another minimum value and change the maximum value, too.

When you're showing a series of charts, viewers naturally assume that the scale remains the same through the series. That's a good reason to start all charts from zero. But doing that may excessively flatten the differences between some of the data series. An alternative is to start the value axis at zero, then add a symbol that interrupts the axis to show that the scale jumps to higher values (see "Custom Axis"). It would be nice if *Excel* would do this on command (Hey, Microsoft! How about in version 2.0?), but you can make one yourself.

Create the interruption indicator just before you print the chart because it will be unattached text. Select the value axis and choose Axis from the Format menu. Change the Minimum Value to a slightly lower number; that lowers where the category axis crosses, leaving room for you to set the zero. Click on a blank area of the chart to be sure no other part is selected. Type two spaces and press Enter. In the center of your chart you will see a blank area surrounded by little black boxes. (If it's sitting on top of an important data point, don't worry.) Choose Patterns from the Format menu and click on the last background pattern, left diagonal stripes; the pattern fills the blank area. Drag the little box onto the value axis, just above where it crosses the category axis. You can alter the size of the pattern by dragging its handles. Adjust its size and position until it appears to break the value axis.

Click again on a blank area, type a 0 (zero) and press Enter. The 0 appears in the center of your chart. Choose Patterns from the Format menu, select the white background pattern, and click OK. Now drag the 0 to cover the bottom tickmark label on the value axis. (The white background hides the old label.) To fine-tune the placement, choose Text from the Format menu. If the value axis is on the left of the chart, click the Right button under Horizontal Alignment. Or vice versa. You might also want to choose Bold and/or a larger type face for emphasis; then click OK. Adjust the size as needed using the handles.

Titillating Titles

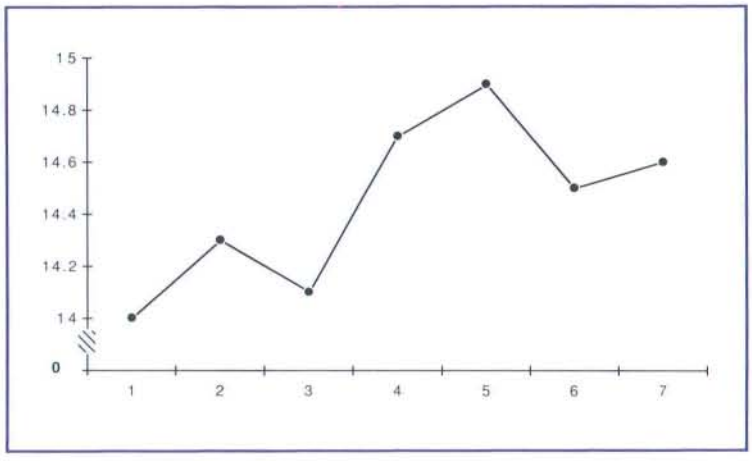
Keep titles short. One line is best. A three-line title is always too long. The title can simply identify the subject: "1986 Sales." Or it can reinforce your point: "1986 Sales up 52%."

Either way, the title should focus on your graph's message. Keep out extraneous material, like the boss's name. You may think you're making points, but it's a distraction to your audience. If you must include such embellishments, keep them away from the visuals–perhaps at the top or bottom of the page or transparency.

When you create a title using Attached Text from the Chart menu, *Excel* always centers it over the plot area. If you then choose Text on the Format menu, the Horizontal Alignment buttons control how a multiline title is justified. Create an off-center title from unattached text. Since an Attached Text title compresses the plot area, creating the title from unattached text may give your graph more headroom.

Once you've got a snappy, attention-grabbing title, you can use a subtitle to explain vital but mundane items like the units of measurement (millions of dollars, price per 100,000 units, volume in metric tons). That's better than crowding the value axis with a label.

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Custom Axis
If you can't plot data from zero, mock up an interruption to the value axis. Use unattached text to produce both the diagonal-line patch and the zero; then drag them into place.

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A Legend in Its Time–and Place

Excel lets you create a chart legend with a single click. Once your category labels are correct, just select Add Legend from the Chart menu. A legend box appears to the right of the chart, but that's not the best place, because the plot area squeezes left to make room for the legend. In the case of column graphs, that might force columns to narrow down to an illegible size. Positioning the legend across the bottom of the chart may take less room. Choose Legend from the Format menu and click the Bottom option.

But even out of the way at the bottom, a legend is usually not the best way to identify data series. To read the chart you first must look at the line or bar or pie-wedge that interests you, then note its pattern or marker, find its match in the legend box, read the label, and finally look again at the line or bar or pie-wedge you've now identified in order to glean its information. That's not a quick read. For multiseries column charts, legends are OK. For other types, I prefer to label the data plot directly.

You can create such labels from unattached text. Click in a blank area so you don't select a chart element by mistake. Type the label text (keep it short) and press Enter. Point inside the boxed area and drag the text. Place a horizontal label on the steep part of a line so it won't cover nearby data markers. If you're labeling several lines, try to place the labels in a neat stack or row.

You can add a pattern swatch keyed to the legend label and move them together anywhere you want. Create the swatch the same way you made the indicator for a broken value axis. Use the appropriate pattern and surround it with a thin black border. If you're manic enough, you'll eventually create a custom legend, one element at a time. Because all of this is unattached text, produce it just before you print the chart.

Bring the Point Home

Excel's chart palette gives you powerful techniques for emphasizing key information in your graph.

■ *Line weight* When making a line graph, *Excel* normally gives each line the same thin weight. Try using the medium or heavy weight on single-line graphs–or for the most important line in a multiline graph. Select the line, choose Patterns

(continues)

A Special Way to Paste

When *Excel* plots a chart, the top row and the first column of the spreadsheet selection have special meaning. If they contain text entries, the program turns them into category tickmark labels or series names. But what happens when your data is in rows and the label row also contains numbers? Numbers like 1982, 1983, 1984–which you mean to be category tickmark labels. The way *Excel* interprets them depends on the top-left cell in the selection.

If that cell is blank, *Excel* treats the top row of numbers as tickmark labels, just as you intend. But if the top-left cell contains an entry, either text or numbers, *Excel* plots the top row as a data series, producing a chart like Product Sales Chart 1 in "Paste Successful." The entry in the top-left cell is usually something extraneous, like *Year*. Erase it, and the data will plot correctly, as in Product Sales Chart 2.

Another way to create charts gives you total control over labels and data. Select a range on the spreadsheet, look at it carefully, and answer three questions.

■ Are the data arranged in rows or columns? (Hint: When you plot more than one data series, you have data in both rows and columns. Which is the right arrangement? Imagine that the chart you want to create is a line graph. Which cells do you want to link as a line? Are they in a row or a column?)

■ Are there labels in the first column of the selection?

■ Are there labels in the top row?

Next, copy your spreadsheet selection and open the new chart.

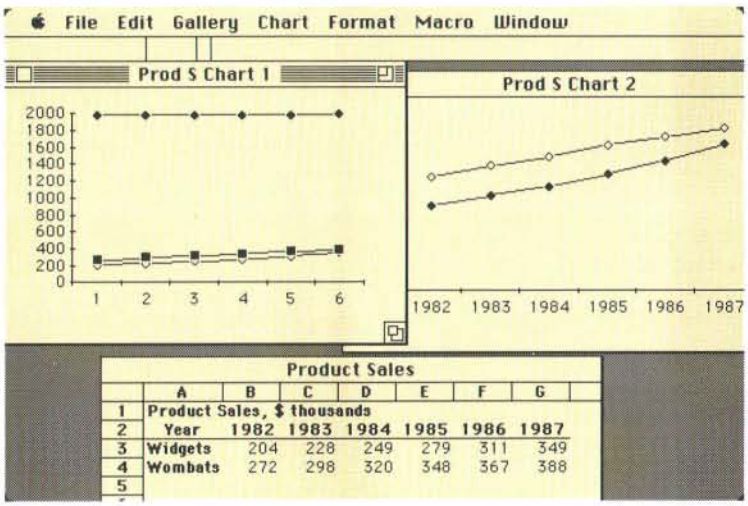
Choose Paste Special from the Edit menu. If the choices in the resulting dialog box confuse you, just refer to your answers:

■ If your data are arranged in rows, click Values in Rows. If in columns, click Values in Columns.

■ Check First Column if there are labels in the first column of your selection.

■ If there are labels in the top row of your selection, check Top Row.

That's it. Click OK, and your data should plot correctly.



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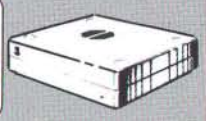
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from the Format menu, click on the line weight you want, and click OK. You can also use a gray pattern to make it less important, but forget the striped, diagonal, or crosshatched patterns. Even *Excel*'s thickest line weight is too thin to display them clearly.

You can shade the space between the category axis and the plot line of a one-line graph (to turn it into an area chart). It's an effective technique, especially if you choose a light fill pattern.

■ *Column charts* Use a heavy border around the most important column in a series.

■ *Pie charts* With *Excel,* you can drag one or more slices slightly out of a pie chart to draw attention to them.

■ *Plotting by Number* Help the viewer analyze the data by arranging the bars from longest to shortest, or vice versa. *Excel* ordinarily arranges data series in the order you paste them. You could carefully paste the series together one bar at a time to obtain a smooth sequence, but if you later change the spreadsheet data, the bar lengths may return to disorderly random lengths. It's easier to paste data series all at once and then change their order if necessary.

To change the plot order, click on a data bar in your chart and note the lengthy series formula that appears in the formula bar below the *Excel* menu. It looks intimidating, but you can ignore everything except the last number. If it's the number 1, that data series is the first one plotted on the chart. If you change the number to 3, *Excel* will replot the chart accordingly and automatically renumber the plot numbers in the other series formulas. By clicking on each data series and changing its plot number, you can turn a jumble into a smooth series.

You can use the same technique to change the order of wedges in a pie chart.

Percentage Charts

Pie charts let you show one percentage; you can put two pies side by side to compare percentages. But to compare three or more data series by percentages, use the 100% stacked chart type that *Excel* offers (type 5 in the Column or Bar gallery). *Excel* doesn't limit the number of patterned segments that stack up to 100 percent, but you might want to exercise restraint. The readers must estimate the percents for most of the stacked segments, so don't overwhelm them with lots of little pieces. Usually three or four data series are plenty for this type of chart.

■ *Printing* When printing on the ImageWriter, your results will usually be more crisp if you select Tall Adjusted from the Page Setup dialog box. If you create test charts on an ImageWriter but plan to make final copies on a LaserWriter, build in some time for making adjustments after you switch printers.

Making a Hit Series

Keep your charts simple–try to present only one idea or one comparison. You can use the chart form, the title, the typefaces, and other design elements to emphasize that one idea. Then use other charts to make other points.

When you create a series of charts, keep the following design elements consistent: typeface, type size, and weight; title locations; axis labels and locations; bar shading and other patterns. Change design elements only to emphasize the point of the new chart.

(continues)



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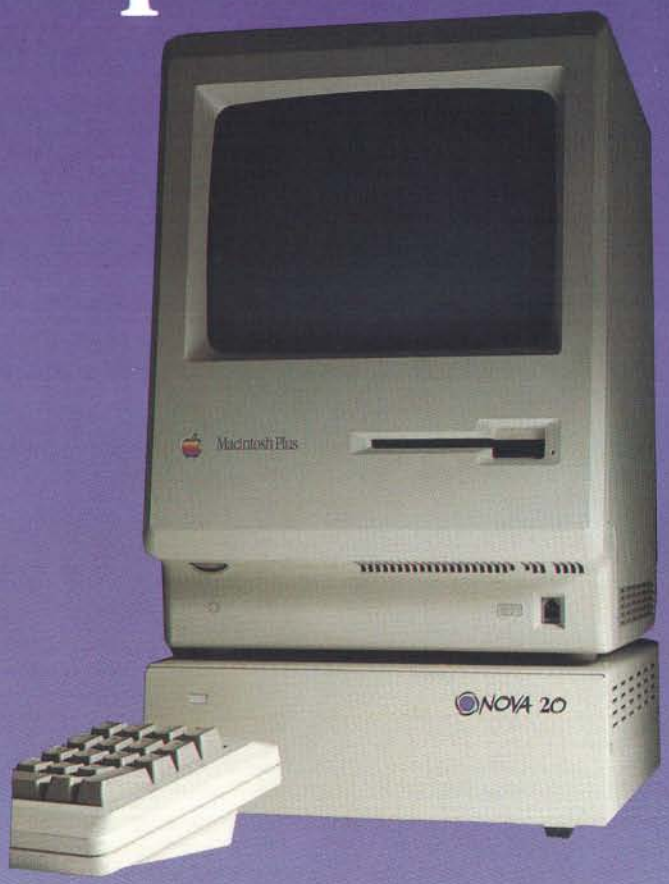
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If you are creating a series of similar charts, you can save a lot of time by creating a generic chart with all the style attributes of the series. Say you are creating a series of ten charts, and want each to be a column chart with 24-point Helvetica Bold titles in shadow boxes, 12 point Helvetica Italic axis tickmark labels, and a legend below the category axis. You only have to set those style attributes once. Create the first chart. Choose Column from the Gallery menu, and click your chart style.

To set the title style, choose Attach Text from the Chart menu. The radio button for Attach to Chart Title is already selected, so just click OK. Now choose Text from the Format menu and click Helvetica, 12 point, Bold, Border Shadow, and OK. Notice that you have not typed a chart title.

Select the category axis, choose Text from the Format menu, click Helvetica 12 point and OK. Follow the same procedure to set the attributes for the value-axis tickmark labels. Repeat the procedure to create a dummy value-axis label. Choose Add Legend from the Chart menu.

Now the good part. Choose Set Preferred Format from the Chart menu. All your formatting attributes apply to any chart based on any worksheet you create before you quit *Excel*.

But, you'll notice, none of the charts have titles. True. Select the first chart. Choose Attach Text from the Chart menu, click OK, type the title and press Enter. The title appears in 24-point Helvetica Bold, surrounded by a shadow box. Why didn't you type it originally? Because it would have become part of the Preferred Format, and would be the title of every chart you make from worksheets created this session.

Presentation

OK, so you've limited each chart to presenting one idea, and now you have 50 graphs that all look alike, except for the titles and the jiggle of the lines. Resist the temptation to introduce variety by changing half the title typefaces from Times to Helvetica Bold. Instead, throw 40 of the graphs away.

But, you protest, that stuff is important! Ever notice how, after you've spent a few hours in a museum, all the masterpieces begin to look alike? Your audience will react the same way–the more masterpieces you show them, the less they'll see and remember.

Nigel Holmes suggests animating graphs to hold your audience's interest in live presentations. If you are showing line graphs on an overhead projector, you can emphasize a line by tracing it with a colored marker.

Or you can have *Excel* only plot a line's data points, and then connect them yourself as you talk. To do this, select the line by clicking it. Its ends will be highlighted by small circles. Choose Patterns from the Format menu. Click the Invisible button. *Excel* displays only the markers for that data series. If you click the Apply to All box, none of the lines will be displayed. Print the chart, take a minute at the copy machine to turn it into an overhead, grab a fat colored marking pen, and you're ready to wow 'em.

A final word of advice. The most common charting mistake is trying to cram too much information onto a single graph. Charts are good for comparing a few categories of data, or for showing one category. If the charting area on your spreadsheet has a lot of columns *and* a lot of rows, watch out. You're probably better off making a table of figures. And that, of course, you can do with *Excel*'s spreadsheet. □

See *Where to Buy* for product details.

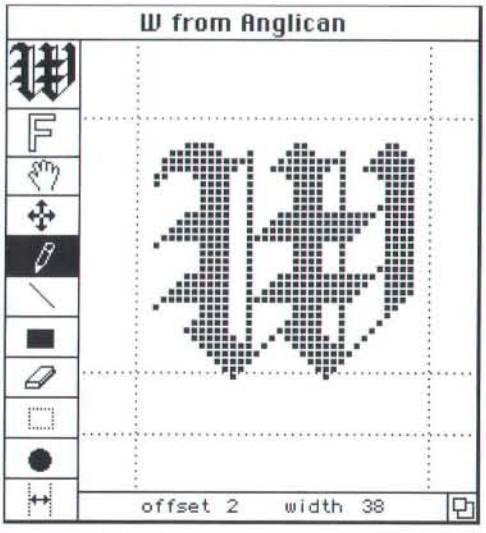
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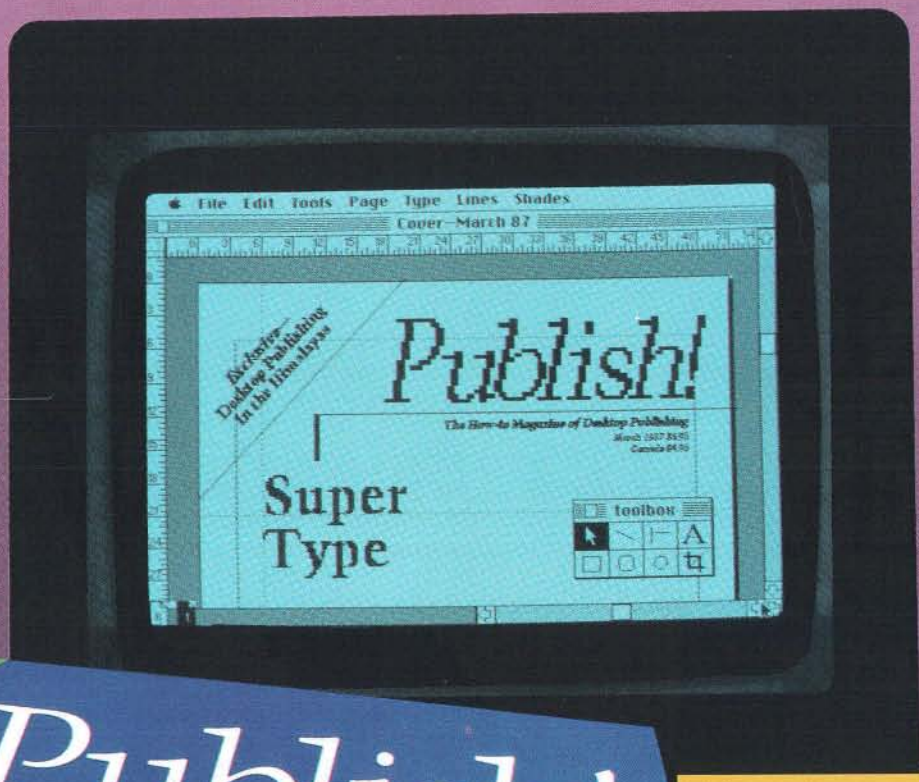
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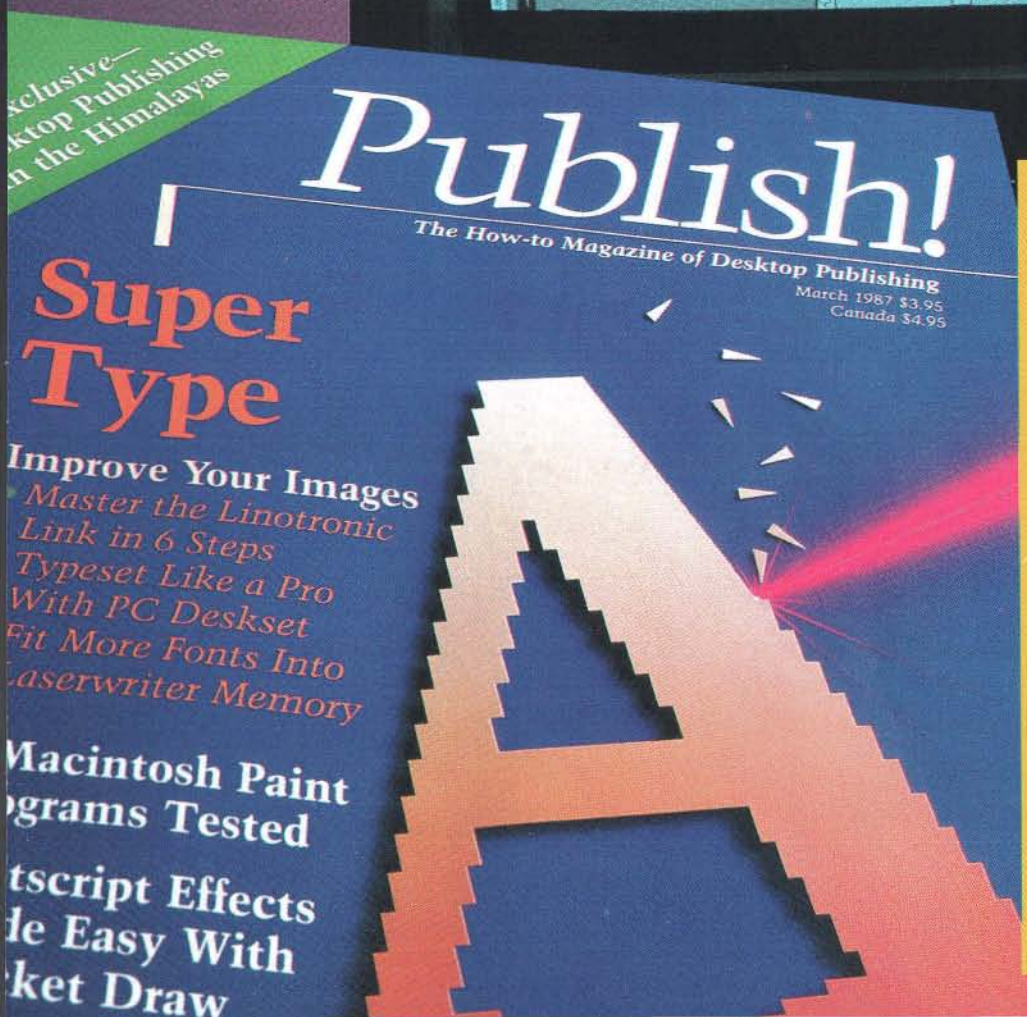
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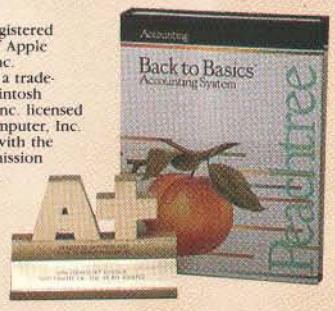
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Updates

This list brings you the highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Acta version 2.0 supports multiple outlining windows and multiple file formats, including *MacWrite, More, ThinkTank, WriteNow;* text, and Microsoft Rich Text Format. Symmetry Corp., 761 E. University Dr., Mesa, AZ 85203, 602/844-2199. Free upgrade with return of original disk and upgrade form plus $2 s/h; $59.95 new.

Canvas version 1.02 reads TIFF and PICT files without creating any distortion. It creates bezier curves, includes a grabber for hand scrolling, and has a new selection rectangle. Comes with built in F-keys. Automatically repositions ruler shadows and duplicate objects. Text and tool enhancements. Deneba Software, 7855 N.W. 12th St. #202, Miami, FL 33126, 305/594-6965. Free; $195 new.

Copy II Mac version 7.0 recovers accidentally erased files from all Mac hard disks and fully supports the Mac II. Central Point Software, Inc., 9700 S.W. Capitol Hwy. #100, Portland, OR 97219, 503/244-5782. $15 with return of original disks; $39.95 new.

Fontographer version 2.3 adds a circle tool and a faster zooming command; generates more compact PostScript fonts. Non-copy-protected backup copies available. Altsys Corp., 720 Avenue F #108, Plano, TX 75074, 214/424-4888. $30; $395 new.

Laser Author version 1.1 contains new features such as hyphenation with an exception dictionary, page preview, and a faster search and replace. Has the ability to search by style. FLI, P.O. Box 49, Ramsey, NJ 07446, 201/444-5700. Free; $179.95 new.

LogicWorks version 1.3 supports multiple circuit windows. It outputs PICT files and has a strip-chart printing mode and automatic naming features. Shift-click lets you select arbitrary groups of devices and signals for editing. MultiFinder compatible. Works with the new LPLC programmable logic device compiler. Capilano Computing, 525 - 108th NE #6, Bellevue, WA 98004, 604/669-6343. $20; $199.95 new.

Mac3D version 2.1 incorporates new features including color printing and a Help command. Challenger Software, 18350 Kedzie Ave., Homewood, IL 60430, 312/957-3475. $50 upgrade from versions 1.0 and 1.1, $20 upgrade from version 2.0, free upgrade from version 2.0 if purchased after June 15, 1987 (enclose proof of purchase date and return disks); $249 new.

Microsoft Works version 1.1 supports *AppleShare.* It includes VT52 and VT100 emulation. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080. Free if purchased after July 1, 1987, otherwise $25; $295 new.

More version 1.1c uses color in outline and graphic elements; provides color highlighting for individual words or phrases. Color in bullet charts allows for the creation of 35mm slides. New version is bundled with *Acta.* Living Videotext, 117 Easy St., Mountain View, CA 94043, 415/964-6300. $40; $295 new.

Plot-It version 2.06 improves rotated text and arrowhead handling. Mesa Graphics Inc., P.O. Box 600, Los Alamos, NM 87544, 505/672-1998. Free if upgrading from version 2.0; $30 upgrade from version 1.0; $125 new, plus s/h.

Trapeze version 2.0 adds new charts and new layout options, such as headers, footers, and international formats. New functions include block rearrangement, matrix/modeling, selection, and statistics. Lets you import and export files in PICT, WKS, or text. The user interface and calculation capability have been enhanced. This version supports color display on the Mac II and is compatible with all large screens. Data Tailor, Inc., 3113 S. University Dr. #500, Fort Worth, TX 76109, 817/921-6083. Free; $295 new. □

To have products listed in this section, send upgraded software, an outline of major changes since the previous release, upgrade price, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, *501 Second St., San Francisco, CA 94107.*



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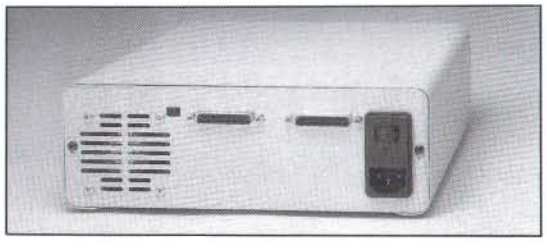
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by Erfert Nielson

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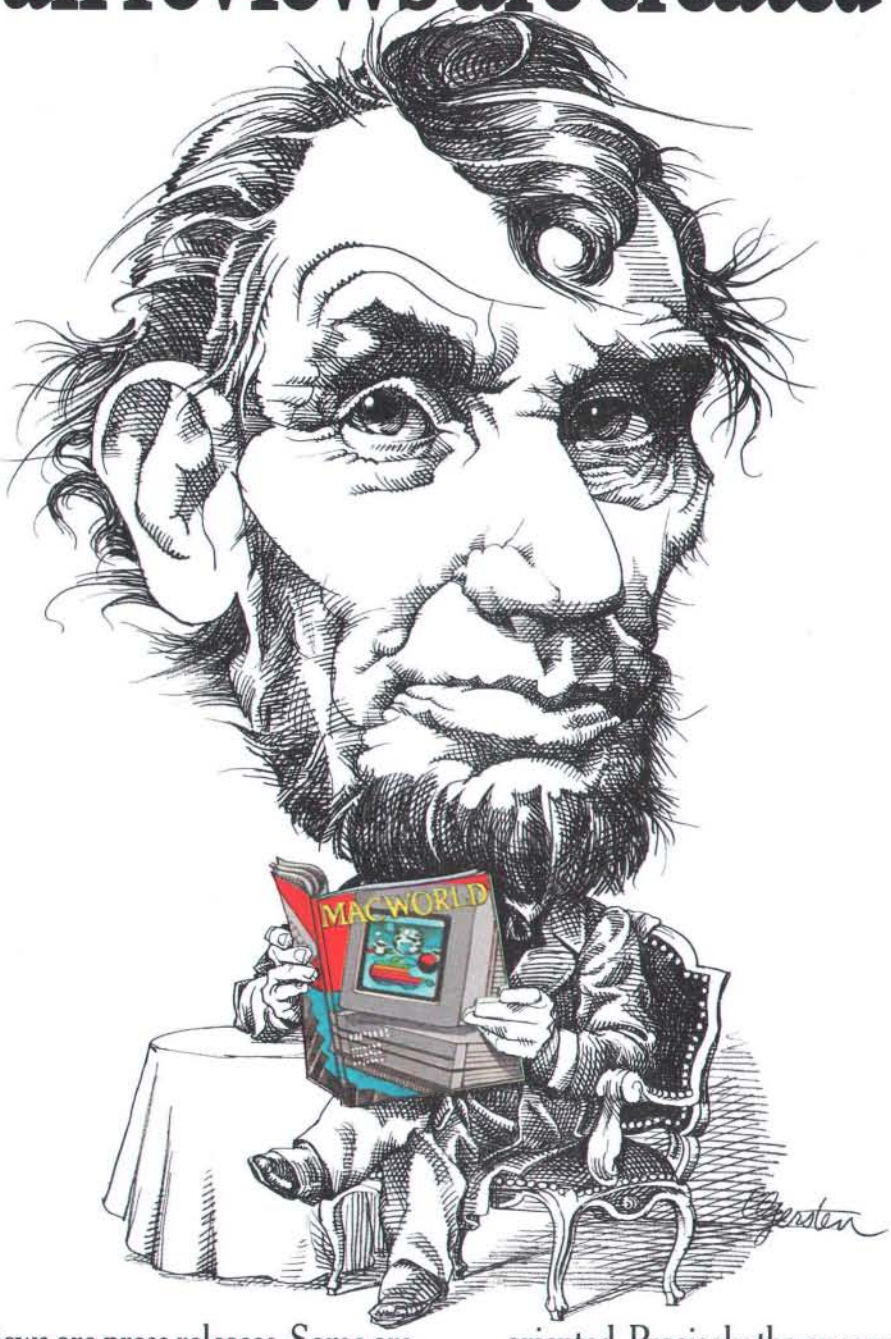
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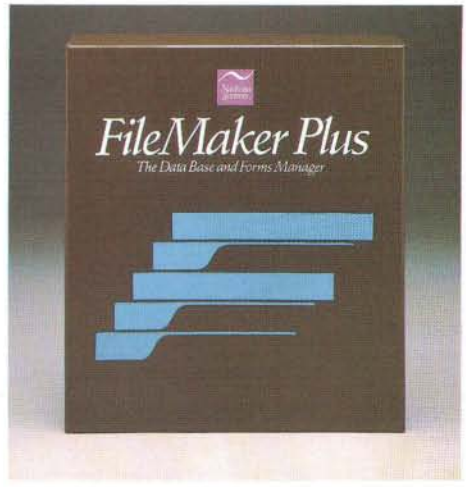
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AppleShare
Version 1.1. Apple Computer, Inc., 20525 Mariani Ave. , Cupertino, CA 95014, 408/996-1010. 512K minimum memory; requires hard disk, AppleTalk, and a dedicated Mac Plus. $799.

AST-4000
AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, 714/553-0340. 512KE minimum memory; requires SCSI port for the Mac 512KE. 70MB hard disk $3699, 70MB hard disk and 60MB tape drive $5295, 140MB hard disk $5995.

Giga Cell 290T
NuData Inc., 3206 Scott Blvd., Santa Clara, CA 95054, 408/727-1049, 800/832-8268. 1MB minimum memory. $8550.

InterBridge
Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348, 404/441-1617. 512K minimum memory; requires Hayes-compatible 2400- or 9600-baud modem for remote bridge. $799.

InterMail
Version 1.35. Internet, 20 Amy Circle, Waban, MA 02168, 617/965-5239. 512K minimum memory; requires hard disk and AppleTalk. 1 to 4 users $349.95, 5 to 10 users $649.95, 11 tq 20 users $999.95, 21 or more users $1499.95.

LaserShare
Version 1.0. Apple Computer, Inc. For address see *AppleShare*. 512K minimum memory; requires LaserWriter, AppleTalk, and a dedicated 512KE or Mac Plus. $299.

NetModem V1200
Shiva Corp., 222 Third St. #1200, Cambridge, MA 02142, 617/661-2026, 800/458-3550. 512K minimum memory; requires AppleTalk and communications software. $599.

TrafficWatch
Version 1.05. Farallon Computing, 2150 Kittredge St., Berkeley, CA 95709, 415/849-2331. 512K minimum memory; hard disk recommended. $195.

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Abaton Scan 300
Abaton Technology Corp., 7901 Stoneridge Dr. #500, Pleasanton, CA 94566, 415/463-8822. 512K minimum memory. $2495.

Abaton Scan 300/FB
Abaton Technology Corp. For address see Abaton Scan 300. 512K minimum memory. $2295.

AST TurboScan
AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, 714/553-0340. 512KE minimum memory; hard disk recommended. Flatbed version $1899, sheetfed version $1699.

Hewlett-Packard ScanJet
Hewlett-Packard, 3000 Hanover St., Palo Alto, CA 94304, 800/752-0900. 1MB minimum memory; requires ScanJet Macintosh Interface Kit. $1495, ScanJet Macintosh Interface Kit $595.

ImageStudio
Version 1.0. Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653, 201/845-6100, 800/526-9703. 1MB minimum memory; requires external drive; hard disk recommended. $495.

Imagizer
Comtrex Ltd., P.O. Box 1450, El Toro, CA 92630, 714/855-6600. 512K minimum memory; requires 800K drive storage and PostScript printer. Imagizer Complete System $2995, Imagizer Basic System $2695, Imagizer and Camera $1995, Imagizer alone $1295.

JetReader
Datacopy Corp., 1215 Terra Bella Ave., Mountain View, CA 94043, 415/965-7900. 1MB minimum memory; requires *MacImage Kit*. $1300.

MacScan
New Image Technology, Inc., 10300 Greenbelt Rd. #104, Seabrook, MD 20706, 301/464-3100. 1MB minimum memory. $1547.

MacScan FB
New Image Technology, Inc. For address see MacScan. 1MB minimum memory. $1995.

Magic
New Image Technology, Inc. For address see MacScan. 512K minimum memory. $399, optional black-and-white video camera $150.

Model 730
Datacopy Corp. For address see JetReader. 1MB minimum memory; requires *MacImage Kit*. $1800.

Model 840
Datacopy Corp. For address see JetReader. 1MB minimum memory; requires hard disk. Model 840 $4800, Model 840i $8995.

MS-300A
Microtek Lab., Inc., 16901 S. Western Ave., Gardena, CA 90247, 213/321-2121, 800/654-4160. 512K minimum memory. $2495.

MS-300C
Microtek Lab., Inc. For address see MS-300A. 512K minimum memory. $1795.

MSF-300C
Microtek Lab., Inc. For address see MS-300A. 512K minimum memory. $1895.

MSF-300G
Microtek Lab., Inc. For address see MS-300A. 1MB minimum memory; Mac II and hard disk recommended. Price to be announced.

PC Scan
Dest Corp., 1202 Cadillac Ct., Milpitas, CA 95035, 408/946-7100, 800/538-7582. 1MB minimum memory; hard disk recommended. $1995.

PC Scan Plus
Dest Corp. For address see PC Scan. 1MB minimum memory; hard disk recommended. $2495.

PC Scan 1000
Dest Corp. For address see PC Scan. 1MB minimum memory; hard disk recommended. $1695.

PC Scan 2000
Dest Corp. For address see PC Scan. 1MB minimum memory; hard disk recommended. $1495.

ProViz
Pixelogic, 800 W. Cummings Park #2900, Woburn, MA 01801, 617/938-7711. 1MB minimum memory; hard disk recommended. $1595.

ThunderScan
Thunderware, Inc., 21 Orinda Way, Orinda, CA 94563, 415/254-6581. 512K minimum memory; requires ImageWriter I or II; hard disk and 1MB or more RAM recommended. $249.

TZ-3
Truvel Corp., 8943 Fullbright Ave., Chatsworth, CA 91311, 818/407-1031. 1MB minimum memory; requires SCSI Interface; hard disk recommended. $4995, SCSI Interface $995.

Pages 120 to 127
HELP!

CJS Systems, 3051 Adeline St., Berkeley, CA 94703, 415/849-3730.

Computer Hand Holding, 1800 Market St. #91, San Francisco, CA 94102, 415/864-2343.

Pages 128 to 137
The Ethernet Solution

Alisa TSSnet
Version 1.2. Alisa Systems, 221 E. Walnut St. #230, Pasadena, CA 91101, 818/792-9474. 512KE minimum memory. One to nine copies $349 each, ten or more copies $299 each.

AlisaTalk
Version 2.0. Alisa Systems. For address see Alisa TSSnet. Compatible with DEC VAX/VMS systems; requires AppleTalk network, Ethernet, and FastPath from Kinetics. $3750 to $11,500.

AST-ICP
AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, 714/553-0340. Requires Mac II and access to UNIX. $999.

CommUnity for the Macintosh
Version 1.0. Technology Concepts Inc., 40 Tall Pine Dr., Sudbury, MA 01776, 617/443-7311, 800/777-2323. Key-disk copy protection. 1MB minimum memory; requires FastNet Box and access to Ethernet; hard disk recommended. $400 per user, $200 for documentation and media.

Du Pont Fiber-Optic LAN for AppleTalk
Du Pont Electronics, 515 Fishing Creek Rd., New Cumberland, PA 17070, 717/938-7683, 800/237-2374. 512K minimum memory; requires AppleTalk. $700 to $1100 per node.

EtherLink/NuBus
3Com Corp., 3165 Kifer Rd., Santa Clara, CA 95052, 408/562-6400. Compatible with Mac II; requires Ethernet cable. Price to be announced.

EtherPort SE
Kinetics, Inc., 2500 Camino Diablo, Walnut Creek, CA 94596, 415/947-0998. 1MB minimum memory; requires Mac SE. $850.

EtherSC
Kinetics, Inc. For address see EtherPort SE. 512K minimum memory. $1250.

FastNet CCU
Dove Computer Corp., 1200 N. 23rd St., Wilmington, NC 28405, 919/763-7918, 800/622-7627. 512KE minimum memory; requires SCSI Port for 512KE. $899 without transceiver, $999 with transceiver.

FastPath
Kinetics, Inc. For address see EtherPort SE. 128K minimum memory. $2500.

K-Talk
Kinetics, Inc. For address see EtherPort SE. 128K minimum memory; requires access to UNIX; 512K recommended. K-Talk Source Code $3500 per CPU, K-Talk Binary Code $875 per CPU.

Macintosh II EtherTalk Interface Card
Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 1MB minimum memory; requires Mac II, other requirements depend on operating system and protocol configurations. $699.

MultiConnect
3Com Corp. For address see EtherLink/NuBus. Requires PairTamer Set and twisted-pair cable. Base unit $1095, Transceiver Interface Module $175, BNC Module $230.

PairTamer
3Com Corp. For address see EtherLink/NuBus. Requires Ethernet controller and transceiver. $325.

pcLink
Version 3.0. Pacer Software, Inc., 7911 Herschel Ave. #402, La Jolla, CA 92037, 619/454-0565. 512K minimum memory; requires 800K of drive storage. 5 users $2000, 20 users $5000, 50 users $10,000, 100 users $15,000, 250 users $25,000, 500 users $37,500.

3+ for the Macintosh
3Com Corp. For address see EtherLink/NuBus. Requires Mac SE or Mac II, and 3S/200. $495.

TOPS
Version 2.0. TOPS, A Sun Microsystems Company, 2560 Ninth St. #220, Berkeley, CA 94710, 415/549-5900. 512K minimum memory; requires AppleTalk; hard disk recommended. TOPS/Macintosh $189, TOPS/DOS $189, TOPS FlashCard $239.

TOPS Terminal
Version 1.0. TOPS, A Sun Microsystems Company. For address see *TOPS*. 512K minimum memory; requires AppleTalk and Kinetic FastPath. $189.

Pages 138 to 145
The PostScript Difference

Adobe Illustrator
Version 1.11. Adobe Systems Inc., P.O. Box 7900, Mountain View, CA 94039-7900, 415/961-4400. Key-disk copy protection; unprotected disk will be sent to registered owners. 1MB minimum memory; scanning device recommended. $495.

Click & Clip
Studio Advertising Art, P.O. Box 18432-52, Las Vegas, NV 89114, 800/235-6646, 800/235-6647 in California. 1MB minimum memory; requires application that reads encapsulated PostScript files. $39.95 per issue, $67 for two issues, $124.50 for four issues.

ClickArt EPS Images
T/Maker Co., 1973 Landings Dr., Mountain View, CA 94043, 415/962-0195. 1MB minimum memory; requires application that reads encapsulated PostScript files. Each volume $129.95.

Collage
PS Publishing, Inc., 290 Green St. #1, San Francisco, CA 94133, 415/433-4698. 1MB minimum memory; hard disk recommended. Price to be announced.

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Pro 60 MacII (40ms)	1095
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Pro 102 Mac II (28ms)	1485
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Digit-Art Volume 3
Image Club Graphics Inc., 2915 19th St. NE #206, Calgary, Alberta, Canada T2E 7A2, 403/250-1969. 512K minimum memory; requires application that reads encapsulated PostScript files; PostScript printer recommended. $149.

Kwikee Inhouse Graphics Services
Version 1.03. Multi-Ad Services, 1720 W. Detweiller Dr., Peoria, IL 61615, 309/692-1530, 800/447-1950, 800/322-3941 in Illinois. 1MB minimum memory; requires CD player; hard disk recommended. $220 per month, $600 per quarter, $2250 per year.

LaserPaint
Version 1.2. LaserWare, Inc., P.O. Box 668, San Rafael, CA 94915, 415/453-9500, 800/367-6898. 1MB minimum memory; external drive or hard disk recommended. $495.

LaserTalk
Version 1.0. Emerald City Software, Inc., 97 Jennings Ln., Atherton, CA 94025, 415/368-8303. 1MB minimum memory; requires PostScript printer. $245.

Post-Art
Olduvai Software, Inc., 7520-A Red Rd., South Miami, FL 33143, 305/665-4665. Minimum memory depends on application; requires application that reads PostScript files. Each volume $69.95.

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Power PostScript Printing

VT600
Varityper, 11 Mount Pleasant Ave., East Hanover, NJ 07936, 201/887-8000 ext. 999, 800/631-8134. 128K minimum memory; requires AppleTalk. $18,750.*

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Because the World Is Round

Dimensions
Version 1.18. Visual Information, Inc., 16390 Double Grove, La Puente, CA 91744, 818/918-8834. 1MB minimum memory; requires external drive. Design Dimensions: Mac Plus and SE version $750, Mac II version $1395. Solid Dimensions: Mac Plus and SE version $395, Mac II version $1295.*

JDL-850 GL+
Japan Digital Laboratory, 2801 Townsgate Rd. #104, Westlake Village, CA 91361, 805/495-3451. 512K minimum memory. $3845.

MSC/pal
Version 1.95. The MacNeal Schwendler Corp., 815 Colorado Blvd., Los Angeles, CA 90041, 213/259-3888, 800/336-4858. 1MB minimum memory; requires external drive; hard disk recommended. $1495.

PlotMaster
CalComp, 2411 W. LaPalma Ave., Anaheim, CA 92801, 714/821-2000. 512K minimum memory; requires *MacPlot* software. $4995.

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Freedom from the Mouse

QuicKeys
Version 1.0. CE Software, Inc., 801 73rd St., Des Moines, IA 50312, 515/224-1995. 512KE minimum memory; requires System 4.1 or later. $99.95.*

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Heavy-Duty Design

PowerTools
Version 1.3. Iconix Software Engineering, Inc., 1037 Third St. #105, Santa Monica, CA 90403, 213/458-0092. Key-disk copy protection; installs on hard disks. 512K minimum memory; external drive or hard disk recommended. $3295.*

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A Graphics Workhorse

Canvas
Version 1.02. Deneba Software, 7855 N.W. 12th St. #202, Miami, FL 33126, 305/594-6965, 800/622-6827. 512KE minimum memory; requires System 4.1 or later version; external drive or hard disk recommended. $195, *Canvas DA* $99.95.*

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Come On, Let's Go

Go for the Macintosh
Version 1.011. Infinity Software, Inc., 1144 65th St., Ste. C, Emeryville, CA 94608, 415/420-1551. 512K minimum memory; 512KE recommended. $39.95.*

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A Tutor for Freshman Physics

Physics
Version 1.0. Brøderbund Software, Inc., 17 Paul Dr., San Rafael, CA 94903-2101, 415/492-3200. Key-disk copy protection. 512K minimum memory; requires external drive. $99.95.*

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It Won't Necessarily Get the Job

ResuméWriter
Version 1.0. Bootware Software Co., 28024 Dorothy Dr., Agoura Hills, CA 91301, 818/706-3887. Key-disk copy protection. 128K minimum memory for student version, 512KE minimum memory for professional version; external drive recommended. Student version $30, professional version $100.*

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Chromatic Options

Modern Artist
Computer Friends, Inc., 14250 N.W. Science Park Dr., Portland, OR 97229, 503/626-2291. 1MB minimum memory; requires Mac II; hard disk recommended. $199.*

SuperChroma
Computer Friends, Inc. For address see *Modern Artist*. 512K minimum memory. $1500, Enhanced Video Option $1500, Hi-Resolution Monitor $650.*

Shinko Color Printer
Computer Friends, Inc. For address see *Modern Artist*. 512K minimum memory; requires SuperChroma for Mac 512K, Plus, or SE, or parallel interface card for Mac II. CHC335 $4500, CHC65 $8990.

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This Base Is Loaded

1stFile
Version 3.5. 1stDesk Systems, Inc., 7 Industrial Park Rd., Medway, MA 02053, 617/533-2203, 800/522-2286. 128K minimum memory. $95, multiuser version $295.*

1stMerge
Version 3.5. 1stDesk Systems, Inc. For address see *1stFile*. 128K minimum memory. $95, multiuser version $195.*

1stPort
Version 3.5. 1stDesk Systems, Inc. For address see *1stFile*. 128K minimum memory. $295.*

1stScan
Version 3.5. 1stDesk Systems, Inc. For address see *1stFile*. 128K minimum memory. $195, multiuser version $295.*

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A Concert in PostScript

ConcertWare+
Version 4.00. Great Wave Software, 5353 Scotts Valley Dr., Scotts Valley, CA 95066, 408/438-1990. 512K minimum memory; external drive or hard disk recommended. $69.95.*

ConcertWare+ MIDI
Version 4.00. Great Wave Software. For address see *ConcertWare+*. 512K minimum memory; requires MIDI adapter when used with MIDI instruments; external drive or hard disk recommended. $149.95.*

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Piece of Mind

Mac-ESP
Version 1.4. Psy-Den America Corp., 44 W. Service Rd., Box 248, Champlain, NY 12919, 514/737-2248, 800/361-2591. 512K minimum memory; hard disk recommended. $49.95.*

Subli-Mac
Version 2.0. Psy-Den America Corp. For address see *Mac-ESP.* 512K minimum memory. $39.95.*

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Getting on the Bus

GPIB-SE
National Instruments, 12109 Technology Blvd., Austin, TX 78727, 512/250-9119, 800/531-4742, 800/433-3488 in Texas. 1MB minimum memory; requires Mac SE. Controller board alone $495, with DMA option $795, with optional 68881 floating-point math coprocessor $995, with both the DMA and 68881 options $1295.*

LabVIEW
Version 1.1. National Instruments, 12109 Technology Blvd., Austin, TX 78727, 512/250-9119, 800/531-4742, 800/433-3488 in Texas. 1MB minimum memory; requires external drive; hard disk recommended. $1995.

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A New Image

AST TurboScan
AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, 714/553-0340. 512KE minimum memory; hard disk recommended. $1899.*

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QUED Pro Quo

QUED/M
Version 2.04. Paragon Concepts, Inc., 4954 Sun Valley Rd., Del Mar, CA 92014, 619/481-1477, 800/922-2993. 512K minimum memory. $119.*

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Fry the Unfriendly Skies

Tactical Jet Fighter
Version 1.0. Electronic Systems & Software Inc., 199 N. El Camino, Ste. F-208, Encinitas, CA 92024, 619/942-0823. Key-disk copy protection. 128K minimum memory. $44.95.*

Pages 219 to 225
Insights on Adobe Illustrator

Adobe Illustrator
Version 1.11. Adobe Systems Inc., P.O. Box 7900, Mountain View, CA 94039-7900, 415/961-4400. Key-disk copy protection; unprotected disk will be sent to registered owners. 1MB minimum memory; scanning device recommended. $495.

ThunderScan
Version 4.0. Thunderware, Inc., 21 Orinda Way, Orinda, CA 94563, 415/254-6581. 512K minimum memory; requires ImageWriter I or II; hard disk and 1MB or more RAM recommended. $249.

Pages 227 to 244
Mac Charting Tools

Designer's Guide to Creating Charts and Diagrams
Watson-Guptill Publications, 1515 Broadway, New York, NY 10036, 212/764-7300. $32.50.

Doug Cobb's Tips for Microsoft Excel
Microsoft Press, 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400. $19.95.

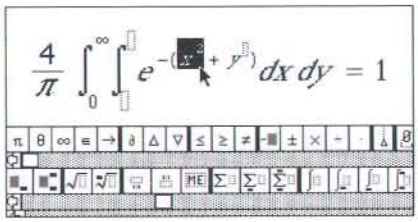
Excel in Business
Microsoft Press. For address see *Doug Cobb's Tips for Microsoft Excel.* $22.95.

Hand-On Excel
Scott, Foresman & Co., 1900 E. Lake Ave., Glenview, IL 60025, 312/729-3000. $21.95.

Microsoft Excel
Version 1.04. Microsoft Corp. For address see *Doug Cobb's Tips for Microsoft Excel.* 512K minimum memory; external drive recommended. $395. □

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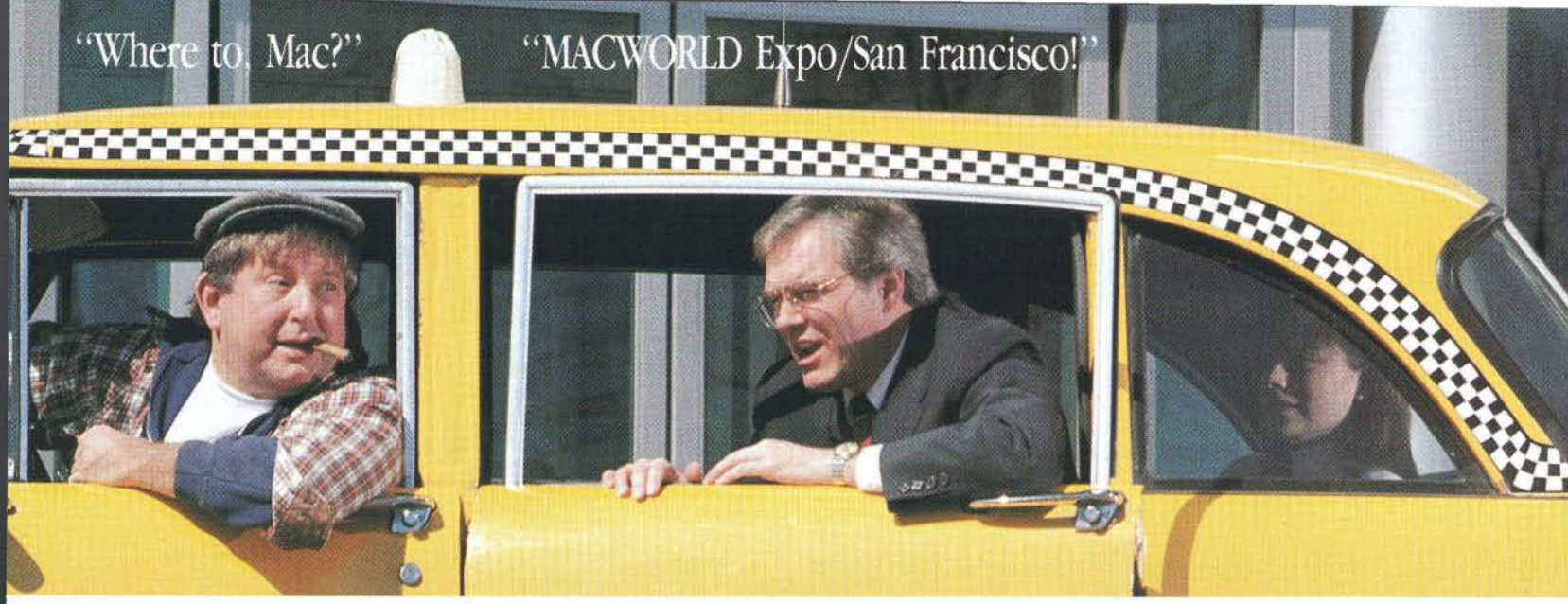
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• MacSolutions Invoices™ is point-of-sale invoicing software for small business • Lenders Construction Services™ is software for construction lenders & contractors for job costing & analysis • Plant Encyclopedia™ is stackware for nurseries & landscape architects. Demos available. Also CMS & DataFrame HD's from $599 & $749. Visa/MC.
MacSolutions, 241 12th St., Del Mar, CA 92014, 619/481-0479

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Stone Edge Technologies, Inc., P.O. Box 200, Maple Glen, PA 19002, 215/641-1825

Instant Data Access
QuickDEX, a free-form database Desk Accessory with autodialer and printing utility. "QuickDEX is the quickets & easiest solution we have found for storing & retrieving simple information."–*MacWeek*. "The speed is truly amazing."–*L.A. Times*. "I use it all the time."–Steve Brecher/Publisher of *Suitcase*.
Greene, Inc., 15 Via Chualar, Monterey, CA 93940, 408/375-0910 Orders 800/331-4321, 800/851-1986 (CA)

○ *Data Acquisition*

MacPacq
The MacPacq transforms the Macintosh into a digitial oscilloscope, chart recorder & waveform generator. A complete data acquisition & control system. 8 channel A/D, 8 digital I/O, programmable gain, 64K RAM. Optically isolated, line or nicad powered. Runs remote and/or connected to Mac. Comprehensive software interface provides for powerful & flexible system. $995 complete.
Biopac Systems, 42 Aero Camino #215, Goleta, CA 93117, 805/968-8880

○ *Desktop Engineering*

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Rebus Development Corp., 651 River Oaks Parkway, San Jose, CA 95134, 408/263-2207. Orders 800/654-5147, 800/247-4994 (CA)

○ *Desktop Presentations*

Color 35mm Slides
Carousel Color Slide Software™ lets you create 256-color 35mm slides from *MacDraw* files. Use graphics from many other *MacDraw* compatible programs. Transfer slide files by modem to a professional imaging center. 2K resolution slides only $7 each. Slides in 24hrs-free delivery. Call for free samples.
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Micro Dynamics, Ltd., Dept. W, 8555 Sixteenth St., #802, Silver Spring, MD 20910, 800/634-7638 or 301/589-6300

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by Microspot prints multicolored graphics & text from most Macintosh software using the Imagewriter II. MacPalette will colorprint documents from *MacDraw, MacDraft, MiniCad, MacProject, MacWrite, JAZZ, Microsoft Chart, Word, Excel* etc. (not *MacPaint*.) It prints black as a true black instead of mixing a black. $69.
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Powerful text editor/database manager. Many convenience editing features: e.g., unlimited undos. Find files with key words, find/replace with wildcard characters, type or record macros, count lines, words, sentences, etc., extract any data from text files. Search through unopened files, etc. $119.
Paragon Concepts, Inc., 4954 Sun Valley Rd., Del Mar, CA 92014, 619/481-1477, 800/922-2993 (Nat'l.)

○ *Educational*

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Chariot Software Group, 3659 India St. #MD1, San Diego, CA 92103, 619/298-0202

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Nordic Software, Inc. 3939 North 48th St., Lincoln, NE 68504, 800/228-0417, 402/466-6502

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MacMedic Publications, Inc., 5805 Westheimer, Houston, TX 77057, 713/977-2655

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Unicorn Software Co., 2950 E., Flamingo Rd. Ste. B, Las Vegas, NV 89121, 702/737-8862

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Revolutionary HomeworkTutor™ lets you do your Algebra homework or classwork on a Mac. Checks each step you enter, gives hints, poses practice problems, solves and explains examples, and prints completed homework. Easy editing, standard Mac interface, and too much more to tell. Send for free brochure.
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InVenture, Inc., 555 DeHaro #330, San Francicso, CA 94107, 415/626-9986, 800/622-9986

○ *Engineering*

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Capilano Computing, 300-1120 Hamilton St., Vancouver, B.C., Canada, V6B 252 604/669-6343

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Fully integrated analysis programs for 2-D frames, trusses, beams: FRAME MAC, BEAM MAC, BEAM MAC II. Structure, moment, defl. diagrams, text & more. $145-$595. Demo available. New: MacCOGO for geometric & structural properties of shapes: $145. COGO MAC available 1/88 (traditional COGO). $-back guarantee.
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Survivor Software Ltd., 11222 La Cienega Blvd., #450, Inglewood, CA 90304, 213/410-9527

○ *Fonts*

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Allotype Typographics, 1600 Packard Rd. #5, Ann Arbor, MI 48104, 313/663-1989

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LaserFonts, the world's largest PostScript font library. 32 font families and growing. ITC fonts. Rated four mice by *MacUser*. For a free, full-function font, send blank disk and business size envelope with 76¢ postage. Catalog with full-page samples, $2. Call or write for free info.
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Star•Com Software Systems, Windsor Park East, 25 West 1480 North, Orem, UT 84057, 801/225-1480

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B. Knick Drafting, 313 Marlin Pl., Melbourne Beach, FL 32951, 305/727-8071

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CompServCo, 800 Freedom, Slidell, LA 70458, 800/272-5533 or 504/649-0484

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by Diehl Graphsoft boasts 1000+ power zoom, symbol library, 40 layers, auto-dimensioning, double-line tool, clip/add/intersect polygons tools, object snap, fillet & trim-lines tools, object sizer & locator, 9 decimals accuracy, full 2-D & 3-D modes, etc. It reads *MacDraw* & *MacDraft* files. $495. Demo avail.
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Appends to a Microsoft FORTRAN program to generate charts/graphs. Includes industry standard calls (plot, line, axis, etc.) and 3D hidden-line routines. Direct interface to clipboard and printers (e.g. LaserWriter) for high-quality output. Graphs can be edited in *MacDraw.* Source code included. $69.95.
Lipa Software, 165 Harcross Rd., Woodside, CA 94062, 415/366-0547

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CAMDE Corp., 4435 S. Rural Rd., #331, Tempe, AZ 85282, 602/821-2310

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Business Library Software, 720 S. Hillview Dr., Milpitas, CA 95035,800/228-2275 (Nat.), 800/221- 4089 (CA)

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○ *Imports*

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- *Japanese Clip-Art* Vol. 1 & 2, $79.95 ea.
- *Mac Calligraphy* simulates medium of ink & brush on paper $149.95. (Enzan Hoshigumi Co.)

Qualitas Trading Co., 6907 Norfolk Rd., Berkeley, CA 94705, 415/848-8080

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Smith Micro Software, Inc., P.O. Box 7137, Huntington Beach, CA 92615, 714/964-0412

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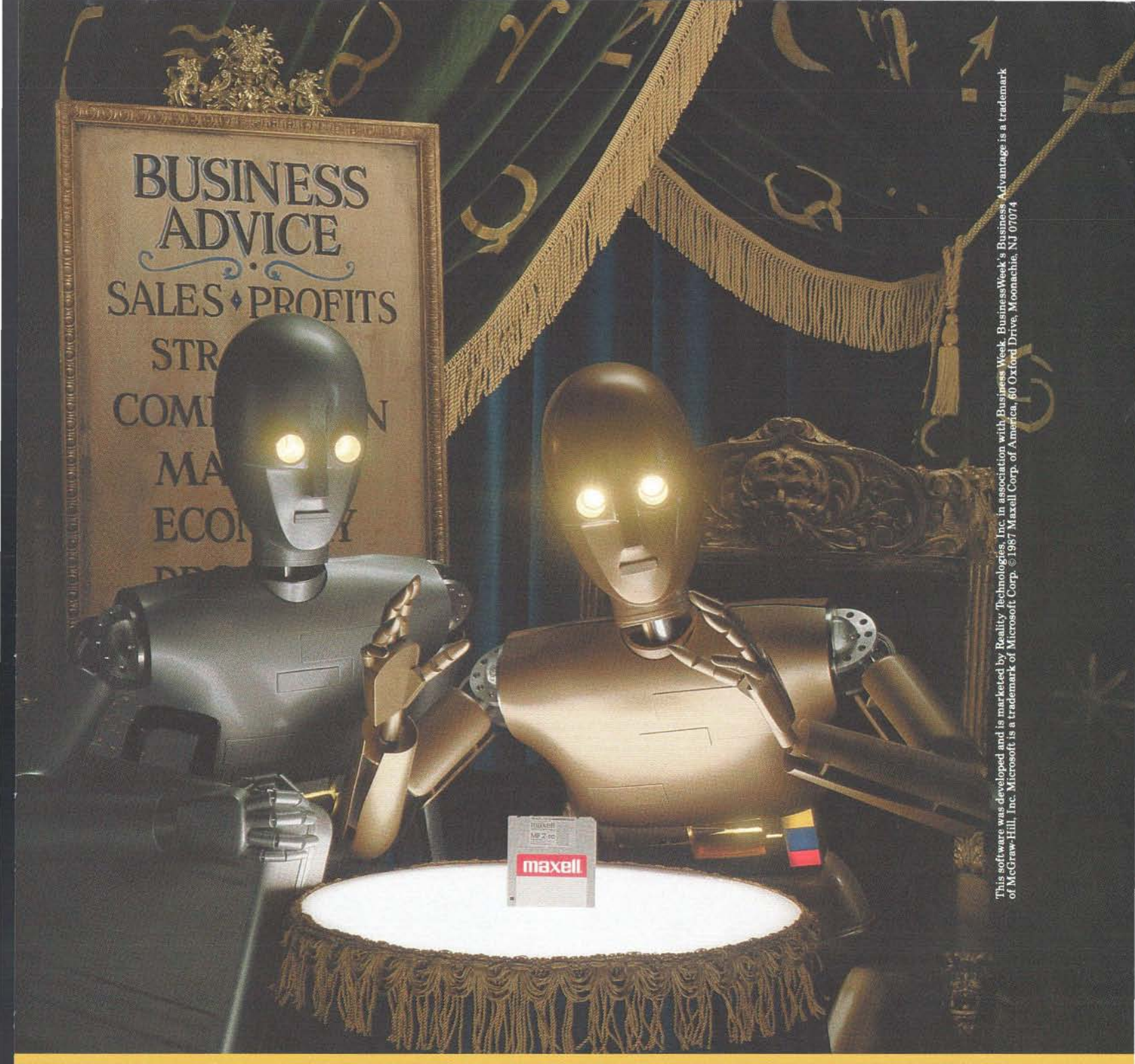
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Months on chart	Last month	This month	
31	1	1	**Microsoft Word** *Microsoft*
11	4	2	**Microsoft Works** *Microsoft*
23	2	3	**Microsoft Excel** *Microsoft*
19	3	4	**PageMaker** *Aldus*
9	6	5	**SuperPaint** *Silicon Beach Software*
27	5	6	**MacDraw** *Apple Computer*
4	7	7	**WriteNow for Macintosh** *T/Maker*
1	–	8	**Cricket Graph** *Cricket Software*
4	9	9	**MacMoney** *Survivor Software*
2	10	10	**ReadySetGo** *Letraset*

Education Software

15	2	1	**Math Blaster** *Davidson & Associates*
13	3	2	**Typing Tutor III** *Simon & Schuster Computer Software*
15	1	3	**KidsTime** *Great Wave Software*
2	5	4	**Speed Reader II** *Davidson & Associates*
1	–	5	**Speller Bee** *First Byte*

Entertainment Software

15	3	1	**Flight Simulator** *Microsoft*
11	1	2	**Dark Castle** *Silicon Beach Software*
15	2	3	**MacGolf** *Practical Computer Applications*
2	4	4	**Hardball** *Accolade*
4	5	5	**Ferrari Grand Prix** *Bullseye Software*

Networking/Data Communications

15	1	1	**AppleTalk** *Apple Computer*
11	2	2	**TOPS** *TOPS*
7	3	3	**AppleShare** *Apple Computer*
14	4	4	**MacServe** *Infosphere*
3	–	5	**PhoneNet** *Farallon Computing*

Hard Disks

Months on chart	Last month	This month	
11	1	1	**Apple Hard Disk 20/20SC** *Apple Computer*
4	2	2	**Macintosh Internal 20SC Hard Disk** *Apple Computer*
5	3	3	**Rodime 20 Plus** *Rodime Peripheral Systems Division*
1	–	4	**Apple Hard Disk 40SC** *Apple Computer*
15	4	5	**DataFrame XP 20** *SuperMac Technology*

Add-in Boards

2	2	1	**Apple 1MB Memory Expansion Kit** *Apple Computer*
2	3	2	**Radius Accelerator** *Radius*
2	4	3	**Apple 2MB Memory Expansion Kit** *Apple Computer*
1	–	4	**Macintosh II Video Card** *Apple Computer*
2	1	5	**MacSnap** *Dove Computer*

Product Watch

Editors' choice:
Other recent products of particular interest.

Cricket Presents *Cricket Software* presentation software

Freehand *Aldus* PostScript drawing program

Interleaf Publisher *Interleaf* high-end electronic publishing software

Source: Exclusive InfoCorp survey of more than one hundred twenty-five Macintosh retailers and selected mail-order suppliers. Covers sales during September 1987.

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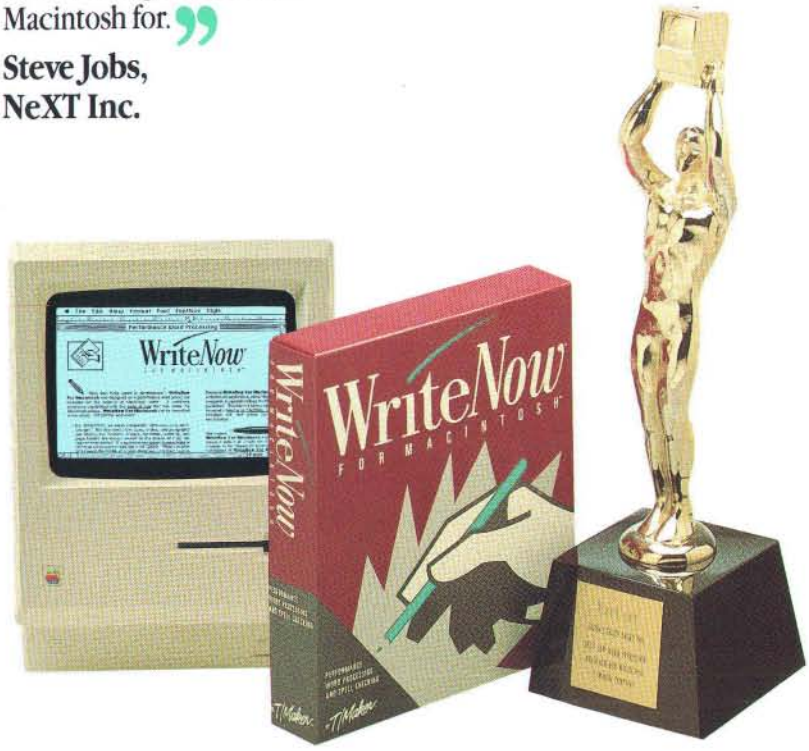
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MacUser Magazine 1986

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2. Protect my Mac from (a) power problems with a System Saver®Mac and (b) the criminal element with an Apple® Security System.
3. Stop annoying people with my ImageWriter®. (No, don't throw it out, just put a Printer Muffler™ on it.)
4. Stop cursing my mouse when it runs off the edge of the desk. (Hint: space is no problem with a Turbo Mouse™.)
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Circle 11 on reader service card

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